RAILROAD GAZETTE

FRIDAY, OCTOBER 18, 1901

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The Anderson-Bevan and the Travis Derailers—Correction.

In the article on derailing switches by Mr. Wileman in the *Railroad Gazette*, of Oct. 11, the titles of the cuts on page 696 were accidentally transposed; the devices shown in Figs. 1 and 2 are both Anderson-Bevan, and Fig. 3 is the Travis derailer.

Contributions

A Steel Car Wheel Plant.

Keystone Car Wheel Co.,
Pittsburgh, Oct. 14, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

The recent announcement of millions to be invested in the manufacture of a new wheel which will "revolutionize" the car wheel industry has brought many inquiries as to the facts in the case and what the results are likely to be, and it has occurred to us that a general reply to these inquiries through your valuable paper might interest many of your readers as well as those more directly concerned.

It is generally known that the great increase in weight and load of the modern freight car has brought out new conditions and requirements in the use of the car wheel, the light chilled iron wheel being found on some roads to be inadequate for the service. A few changes have been permitted and others suggested and while it is the firm belief of the manufacturers that all difficulties may be solved by them if given the opportunity, yet it appears that the entire question, at least so far as it relates to flanges, has practically solved itself in the advent of the Barber truck now being installed on the Baltimore & Ohio and other roads for use under their heavy freight cars. This truck now performs the service of prying the tremendous load around the curves instead of compelling the flange of the wheel to do it, so that it is reasonable to assume that the car wheel question is not particularly different from what it has been during the past 10 years and that the satisfactory results obtained in meeting the extremely severe tests now imposed have resulted in a better product being supplied and very satisfactory results in service in consequence.

On the other hand it is believed that car wheel manufacturers generally would welcome the advent of a successful steel car wheel. Millions have already been spent in this direction with indifferent results, but a successful steel wheel would mean one that would be sold at a satisfactory price commensurate with the greater mileage presumably to be obtained. If such a wheel (after being pressed to shape, turned and case hardened on tread and flange), could be bored for the axle and otherwise made practicable, it is assumed that the price even under most favorable conditions would be considerably higher than the price of the cast-iron or chilled wheel and would therefore enable the manufacturer of the latter to compete for the first time in his life with a higher-priced product, which would naturally have a tendency to raise the price of the chilled wheel and by the same token tend to improve its quality.

It is thought that the new wheel would probably supplant the present steel tired or "built up" wheel so-called, and if, as in the case of the wooden car, the new wheel would actually raise the price of the old type, the car wheel manufacturers in general would receive it as a very desirable competitor.

CHARLES V. SLOCUM, *President*.

The Brooklyn Bridge—Its Defects and Treatment.

New York, Oct. 15, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

The report of Messrs. Duryea and Mayer, on the Brooklyn Bridge, which is a direct result of the recent accident and which has now been made public, has given much valuable information about this structure. Like other metallic structures the strength of this bridge is limited and the capacity of the cables and anchorages is less than would be given to a new bridge to be built to-day, but it is practically as strong as it ever was. About two years ago another accident occurred of a different character, but attributable to the same general effect. The accidents which have caused alarm have really had nothing to do with the limit of capacity of the bridge.

There is no one thing in which the bridges of to-day differ more from the bridges of older design than in their simplicity. The metallic bridge of to-day is a skeleton in which the different members are so arranged that they work together; the action of one member under strain does not disturb the action of another. In the older designs of bridges this was not the case; wooden truss bridges were frequently combined with timber arches, although the deflections of the two could not be the same; the low coefficient of expansion in timber enabled one to adapt itself to the movements of the other. The McCallum truss, once the favorite wooden bridge, was another instance of this kind, the wooden truss being supplemented by what were called arch braces which, under special conditions of loading actually caused the ends of the truss to lift from their bearings.

The same principle was extended to the older suspension bridges. The simple chain bridge was too flexible for general use and something had to be added to give it the desired rigidity. Mr. John A. Roebling, who did more than any other man to develop suspension bridges, relied very largely on the use of what he called stays, which correspond to the links of a straight link suspension bridge, these stays reaching from the tops of the towers to various points on the floor. In his older bridges he used a timber stiffening truss and this timber accommodated itself to the action of the cables, in much the same way that the timber arch did to the wooden truss. The high value which Mr. Roebling attached to this class of combination construction, is best shown by a plan he prepared for a bridge at St. Louis and which was published by his son, in which he combined cables, arches, stays and stiffening trusses.

The Brooklyn Bridge, though completed after his death, followed closely his design, but it was a bridge of unprecedented magnitude and the stiffening trusses were made of steel, and being steel provision must be made for expansion and contraction. The main cables with vertical suspenders carrying the floor are a true suspension bridge; the stiffening trusses cut at the center of each span in combination with the stays or straight links are cantilevers. The two systems cannot work together, although under normal conditions they will do so approximately. In extremely cold weather the contraction of the cables lifts the center of the bridge and practically relieves the stays of weight. In extremely warm weather the cables deflect and an undue share of the weight is thrown on the stays. Furthermore, the arrangement is inconsistent with a true stiffening truss. A stiffening truss must be able to bend within permitted limits, these permitted limits varying with the character and use of the structure. The less the permitted limit of bending the deeper the stiffening truss must be: the greater the permitted limit of bending, the greater the amount of irregular load which can be taken care of by a distortion of the cables themselves. This leads to what at first sight seems a paradox; by increasing the depth of the truss the strains in the chord members are increased instead of diminished. With any condition a stiffening truss should either be continuous from one end of a span to the other or hinged, but not cut, at a single point at the center; the latter arrangement, though having certain theoretical advantages, presents practical difficulties which would generally prevent its adoption. The stiffening truss must at both ends be able to resist both an upward and a downward force; in other words, it must be anchored down as well as supported. The greatest distortion and the greatest strain on a stiffening truss occurs when one-half of a span is loaded and the other half is entirely unloaded. This is a condition which cannot occur on the Brooklyn Bridge as its traffic, though varying greatly in intensity at different times of the day, is always comparatively uniform over its whole length. For this reason a considerable change of shape under assumed maximum conditions can be allowed without practical inconvenience and this means that a very shallow stiffening truss, perhaps not over 10 ft. deep, would meet all requirements.

The troubles that have occurred on the bridge have been two. In the first case, the extreme strain on the stays, which form the tension members of the cantilevers, caused the chords of the stiffening truss, which are the compression members of the cantilevers, to buckle; this could never have occurred if the duties of the stiffening truss had been limited to its proper functions. In the second case, the slip joint at the center of the span caused the short vertical suspenders to be deflected so far from their true positions that undue strains were created which finally resulted in rupture; this could not have occurred if the stiffening truss had been a true one, continuous from tower to tower, with provision for expansion at the ends instead of the center.

The Brooklyn Bridge may be divided into three parts: the masonry of the towers and anchorages; the cables; and the suspended superstructure, the latter comprising both the stays and the so-called stiffening truss. Of these three the first two are correctly designed and admirably made. The defects in design and the troubles experienced are confined to the third. The proper remedy is to replace the present suspended superstructure by a properly designed stiffening truss suspended by vertical ties from the cables, without the inclined stays, with expansion provision at the towers only, where the length of the suspenders readily accommodates a horizontal motion. While this may seem a radical proposition, it is equivalent to what is being done on nearly all of the older bridges; they, however, consist of two parts instead of three, a substructure and a superstructure; the substructure is retained and the superstructure is renewed. In this case the substructure and the cables should be retained and the suspended superstructure only renewed. A new suspended superstructure, though not increasing the capacity of the bridge, would render such accidents as have occurred impossible.

GEORGE S. MORISON.

The Railway Signaling Club.

The Railway Signaling Club held its annual meeting at Buffalo, Oct. 8 and 9, President C. C. Rosenberg (L. V.) in the chair. Over 40 members were present and about 25 new members were elected. The Treasurer reported cash on hand at the beginning of the year $289; receipts, $625; total, $914; expenses, $765; balance in hand, $149. The first day's meeting was held in the audience room of the beautiful new New York State Building on the grounds of the Pan-American Exposition, but on the second day, owing to the presence of the Governor of the State and a great crowd of visitors at the fair, the club held its session at Statler's Hotel.

The first business was the discussion of the paper by Mr. Christofferson on the adjustment of cranks and compensators, which was reported in the *Railroad Gazette* of last week. There was considerable difference of opinion as to whether stroke should be gained at the lever or at the far end of a pipe line.

Mr. Elliott (C., M. & St. P.).—The length of line which a compensator can adjust depends on the length of the arms. With 14-in. arms 700 ft. can be taken care of. For a length of 950 ft., 17-in. arms should be used. In putting in connections in very hot weather, a simple rule is to adjust the arms of the compensator so that they do not touch each other. Mr. Christofferson's table should be tested by members in their next new work, and the experience with it should be reported to the club.

As to whether a compensator should be set exactly in line with the pipe line, Mr. Christofferson and others said they usually fixed the bolts ¼ in. to one side.

Mr. Christofferson, replying to a question, said the figures in his paper were based on observations of temperature taken in the sun.

The discussion having brought out much experience but not many statements of reasons, Mr. Sperry (U. S. & S. Co.) moved that a committee be appointed to investigate and report on all the questions dealt with in the paper; and at the close of the meeting the President appointed such a committee.

In the discussion of Mr. Balliet's paper, the first question taken up was that of the amount of battery necessary to work a track circuit. Mr. Elliott's longest track circuits are 3,000 ft. long. Mr. Short (C., N. O. & T. P.) has circuits from 900 ft. to 5,000 ft., but the longest he has on gravel ballast is 3,000 ft.

Mr. Yocum (P. & R.).—The size of rail, as well as the ballast, should be considered in making track circuits. With 90-lb. rails and clean rock ballast, 6,500 ft. can be worked; with mud we cannot work over 500 ft.

Mr. Mock (Mich. Central).—We find in some places as much difficulty in working 2,000 ft. as in working 4,000 ft. on better ballast.

Mr. Balliet (L. V.).—We sometimes encounter the difficulty of salt, which drips from refrigerator cars; oil (used to lay the dust) is a partial remedy for this difficulty.

The meeting then discussed the question whether glass or porcelain is preferable for battery jars. Mr. Hollister (I. C.) uses glass jars for track circuits. Mr. Short thought porcelain generally preferable to glass. The maintainer should not inspect the solution too much, as it will lead him to neglect the rule to clean the battery at regular intervals.

Mr. Hope (C., St. P., M. & O.).—Why not get a glass jar which will be as strong as porcelain?

Mr. Balliet.—We find most of the breakage due to lack of care in taking jars out of wells and in putting them back. With porcelain our loss from breakage has been only one in 10,000. Glass deteriorates in time.

Mr. Elliott.—We have no trouble from breakage in dropping jars into wells, as a breakage at such a time is discovered and remedied at once.

Mr. Balliet.—We use strips of wood under glass jars to give circulation of air and even temperature, thus preventing breakages.

Mr. Foster (P., C., C. & St. L.).—Very cold water put into a warm jar will cause cracking.

Mr. Balliet.—The solution should be poured in while the jar rests on wood, not on earth.

Mr. Yocum.—After much testing of glass we have adopted porcelain jars for rail circuits; use glass for signal circuits. Maintainers should not be forbidden to inspect track batteries whenever they deem inspection necessary. A derailment of cars may short-circuit a battery and use it up.

The meeting next discussed the three plans of maintenance mentioned by Mr. Balliet. Mr. Yocum thought all three plans good. Mr. Foster uses the second method, as does Mr. Elliott.

Mr. Elliott.—By the first plan you have for two or three days only one effective cell. Our gravity batteries work perfectly 31 days. We have made careful tests for 60 days and find this time limit quite uniform.

Mr. Balliet.—We have tried all three plans; the second is satisfactory. It is a question how long we should run the zincs. We use circular zincs, which are preferable to the crowfoot. At this point there was considerable discussion about the weight of zincs, new, and how light they should become before being taken out, but it appeared that some of the speakers were reporting experience with the crowfoot while others spoke of circular zincs, so that the comparison was not particularly instructive. Mr. Elliott, in his tests, had found amalgamated zincs 5 per cent. better than those not amalgamated. Mr. Balliet renews one (circular) zinc every three months and uses it down to 12 oz.

The subject of bond wires was next taken up. Mr. Short uses, in tunnels, copper bond wires, which are not destroyed by sulphurous gases as soon as are the iron wires. Mr. Balliet had tested in a long tunnel (a) No. 8 B. W. G. soft drawn copper; (b) hard brown copper and (c) Norway iron. He found that the hard copper lasted nine months longer than the iron, and the soft copper 18 months longer.

Mr. Balliet.—In tunnels the strength of the current fluctuates and this makes copper particularly desirable. With copper the hole in the rail must be small and the pin must be driven in hard.

Mr. Elliott, replying to a question, said that sometimes a bond wire put behind the splice bar would rust faster than outside of the bar, but he generally puts them behind, and in towns or cities always does so to prevent tampering with them. He had very few breakages of wires behind the bars. Breakages occur near the end of the bar. Rust is more troublesome over cinder ballast.

Mr. Yocum.—We put wires outside of splice bars, having found that the wires were sometimes cut away when bolts were screwed up. It was thought better to have the wires in sight, even though they break oftener, as it takes less of an inspector's time to discover the trouble.

Mr. Balliet, replying to a question, said that in places where salt water falls on the track, wires behind splice bars last about 18 months; in more favorable situations six years.

Mr. Spaulding (Boston & Maine).—Our wires outside the splice bar last seven years. This is on tracks used exclusively by passenger trains. Under platforms they have to be renewed every two years.

On the question of discipline of maintainers the principal fact brought out was that trackmen do not co-operate as they should with the signalmen. Mr. Wileman (L. S. & M. S.) said that on his road the maintainers were under the supervision of the roadmaster; this makes the men of the two departments work in harmony. Mr. Short had found that with care and patience trackmen could be educated to a fair degree, and he now has co-operation between the two departments.

Second Day.

On Wednesday the meeting resumed the discussion of Mr. Balliet's paper, taking up the question of economy in batteries.

Mr. Balliet.—Without strict supervision maintainers will keep up more battery power than is necessary, and it is easy with 1,500 signals to use many hundred cells more than would be necessary with suitable care. We instruct our men to clear the home and distant signal and then test the battery. About 105 milliamperes is enough to work a signal, but our standard is 125, so as to provide for emergencies.

Mr. Short.—Our minimum is 150 for both clutch and disk signals; 125 is not sufficient to cover all fluctuations.

Mr. Balliet.—It would be cheaper to substitute copper for your iron return wires and use less battery; the extra cost of the copper would be saved in two years.

Mr. Yocum.—We allow men to renew battery when they think necessary; a rigid rule sometimes proves wrong.

Mr. Short.—We have to have an ironclad rule; the men's judgment is not trustworthy.

Mr. Balliet.—Our general office keeps careful records, and if there is a diversity in the service on different divisions the matter is investigated. We test batteries and battery material in the laboratory frequently.

Mr. Foster, replying to a question, said that on his road storage batteries, used to work semaphore arms, were charged from gravity batteries, except on the 35 miles near Pittsburgh, where a dynamo is used to charge everything.

Mr. Elliott questioned the wisdom of depending on voltmeter tests of batteries. A battery nearly exhausted will still work 15 seconds and show a good reading and deceive the inspector.

It was remarked that in the absence of instrumental tests a good rule was to look at the zinc; if it still retains its shape the battery can be depended on. With motor signals the behavior of the motor, when in operation, affords, to an experienced eye, a good indication of the battery.

Mr. Sperry asked why it would not be better to have better men out on the road and thus avoid dealing with so many fine questions in the office; but Mr. Balliet took a decidedly opposite view, holding that the man at the head of the department should guide the work in all details and know at all times exactly what was being done.

The meeting then took up the questions propounded in the letter sent to the members by Mr. Rosenberg; and in answer to questions by the President a number of members gave facts concerning their respective roads.

Mr. Yocum.—The signal engineer reports to the Chief Engineer on all new work, but on maintenance he reports to the General Superintendent. The signal engineer should not be required to look after all details of operation, as this will keep him at his office all the time looking over reports. We are slowly adopting the plan of having the Division Superintendent absolutely control all operations on his division.

Mr. Elliott.—The signal engineer reports to the General Superintendent. There is a foreman for each of several districts. With a very large mileage and signal plants widely scattered, some divisions having but a few, division organization as on roads more fully signaled, is not practicable. Signalmen in cabins report to the Division Superintendent.

Mr. Short.—There is a signal engineer on each of the two divisions of our road; he reports to the Superintendent of Telegraph and also to the Division Superintendent. The signal engineer has charge of maintenance and construction. There is a foreman of interlocking and a foreman of electric signals. There are two or three construction gangs. All our new work is put in by our own men.

Mr. Spaulding.—We have a Superintendent of Signals who reports to the General Manager; does not have charge of signalmen, except that at the Boston terminal station the Supervisor has charge of both the apparatus and the signalmen.

Mr. Rosenberg.—The signal engineer reports to the Engineer of Maintenance of Way; makes all plans and contracts, approves all changes in location or locking. Division Superintendent has charge of signalmen. The road has floating gangs of electrical men and of mechanical men. Reports of operation, and of failures, etc., come to the signal engineer through the Division Engineer. The signal engineer receives daily telegraphic reports of failures, and summarizes these, with his comments, monthly, and makes a report on the facts to the Division Superintendents. Maintainers and battery men are appointed under the authority of the several division superintendents, but the appointments have to be approved by the signal engineer.

The next discussion was on the relative merits of power and manual interlocking.

Mr. Spaulding.—We have an 84-lever Johnson mechanical interlocking machine which has given excellent service at a complicated crossing, but the experience of the last seven years has shown that we ought to have a power plant in place of it. At another junction, smaller (60-lever machine) we are not sure that power operation is desirable. At our terminal (Boston) we have 120 levers, high-pressure pneumatic. We could not work these switches and signals mechanically without dividing the work between two separate cabins. We handle 606 trains in 17½ hours. A record for 24 hours has shown lever movements averaging about 1,800 movements per hour. There are three men, which makes an average of 10 movements per minute by each man.

Mr. Yocum.—We have high pressure pneumatic at Reading Terminal and low pressure at two other plants. In any cabin where two men are required, power is superior to manual. At the Reading Terminal the cost of maintenance has been less than it would have been with purely mechanical apparatus.

Mr. Sperry, replying to a question, said that whether to use a power plant depended on the amount of traffic, the cost of the machine and the number of men employed in the cabin. At a large crossing in the West manual working was found cheaper than power because the number of train movements was small; but there are some smaller crossings, with more frquent trains, where power is economical.

Mr. Cade (Standard Signal Company).—One point to consider is the additional safety which is secured in power apparatus by the "return indication." When we have inquiry for a machine of 48 levers or more we begin to consider whether power will not be cheaper than manual. Railroad managers lay undue stress on the question of first cost. It is not easy to convince them of the economy which we promise them will be secured by cheaper maintenance, though they will listen to propositions to save wages.

Mr. Salmon (Taylor Signal Company).—The question of the number of levers is not important. We have put in (all electric) interlocking machines with only six levers. It is always economy to use power where you can avoid putting up a second cabin. We can work switches 1,500 ft. away. Power is always more economical than manual if a manual machine would need two men. Power is always advantageous where mechanical rods above ground would be objectionable. Our experience shows that the cost of power is too small to be considered. At Sixteenth and Clark streets, Chicago, a large plant, it is less than $4 a month; at South Englewood, Ill., less than $2 a month, for 120 levers. At the first-named place a 5-h.p. engine is run eight hours once in nine days. We shall show with electric machines that power is economical for plants of from four levers to 300 levers. A comparison between compressed air interlocking and "all-electric" has shown that 20 gals. of gasoline in the latter will accomplish the same as 100 tons of coal in the former.

The President appointed the following committees: On Mr. Christofferson's paper, Mr. Christofferson, Mr. Elliott, Mr. Wileman; on Track Circuits, Mr. Yocum, Mr. I. S. Raymer (P. & L. E.), Mr. Jones (Atlantic City); on Signal Circuits, Mr. Mock, Mr. Foster, Mr. Boyce (C., St. P., M. & O.); on Copper and Iron Line Wires, Mr. Balliet, Mr. Short, Mr. Raviller (P. & R.); on Power versus Manual Interlocking, Mr. Spaulding, Mr. Lane (L. V.), Mr. Dryden (S. I. R. T.), Mr. Temple (B. & O. S. W.), Mr. Goff (N. Y. O. & W.); on Organization, Mr. Ashby (L. V.), Mr. Hope, Mr. Keppel (P. R. R.).

The election of officers for the ensuing year resulted in the re-election of Mr. Rosenberg as President and Mr. C. O. Tilton (C., M. & St. P.), West Milwaukee, as Secretary; C. Dunham (I. C.), Vice-President, and S. E. Denny (C. & N. W.), member of Executive Committee. The place selected for the next annual meeting (November, 1902) is Pittsburgh, Pa.

On Wednesday afternoon the members were taken by special train to Batavia over the Lehigh Valley, as the guests of the railroad company, to inspect the new automatic Hall signals in use on that road. The newest signals are semaphores, but disk signals were also inspected.

The Lehigh Valley, as the readers of the *Railroad Gazette* have already been informed, enjoys the distinction of being the first trunk line railroad to equip the whole of its main line with automatic block signals. This work has lately been completed, and the Engineer of Maintenance of Way has made an interesting summary statement of the signaling on the entire road, from which we quote the following facts:

The main line between Jersey City and Buffalo is divided into 366 eastbound and 379 westbound blocks, or a total of 745 blocks in both directions; 516 of these blocks are equipped with the disk type and 229 with the semaphore type. There has also been some signaling done on some of the branches of this road, amounting to 34 blocks.

All switches are provided with visible indicators. The indicator displays a red disk from the time a train enters the second block back until it has passed out of the block in which the indicator is located. All switches in main track and all switches leading to main track are taken into the signal circuit. The signaling on the system is summarized as follows:

Signals, main line, disk	1,032
Signals, main line, semaphore	458
Signals, branches, disk	62
Total	1,552
Mileage, main line, double track, disk, miles	264
Mileage, main line, double track, semaphore, miles	164
Mileage, main line, single track, disk, miles	11
Mileage, branches, single track, disk, miles	28
Number of blocks under ½ mile in length	71
Number of blocks from ½ to ¾ mile in length	104
Number of blocks from ¾ to 1 mile in length	153
Number of blocks from 1 to 1¼ miles in length	137
Number of blocks from 1¼ to 1½ miles in length	117
Number of blocks from 1½ to 1¾ miles in length	80
Number of blocks from 1¾ to 2 miles in length	51
Number of blocks from 2 to 2¼ miles in length	24
Number of blocks from 2¼ to 2½ miles in length	5
Total number of blocks	745
Average length of blocks, miles	1.16
Cross-overs in main line protected	133
Cross-overs leading to main line protected	49
Siding, inlets and outlets, main line protected	375
Cross-overs on branches protected	17
Sidings on branches protected	14

All signals are Hall, track-circuit, the home signals standing normally in the stop position and the distants in the caution position.

Superintendents of Bridges and Buildings Convention.

The Association of Superintendents of Bridges and Buildings met in Atlanta, Ga., Oct. 15 to 17. The report of the meeting was not available at the time of going to press, but extracts from such papers as were issued in advance are given now and the others will be published next week, together with the discussion.

The papers this year, so far as we have seen them, are unusually interesting and to the point. The reports on operating turn-tables by power, whether railroads or bridge companies should erect steel structures, and the uses of compressed air in bridge work are well worth careful reading and discussion:

PASSENGER PLATFORMS AT WAY STATIONS.

Information was received from all sections of the country and probably includes all kinds of platforms in general use in the United States. Thinking that the members were familiar with the matter of building platforms we have tried to give what we thought would be most valuable to them, viz.: The cost of platforms, the length of time they will last, and the satisfaction they give in service. We find that there is a great difference in the cost of labor and material in the different sections of the country. The price of lumber runs from $9 to $30 per thousand, with the cost of labor from $1 to $3 per day. With this variation of prices the cost of a certain kind of platform in one section might be thought too high, or low, in some other section. Having this in mind we have given the average cost of each different kind of

platform, with the average life and the results obtained from its use.

All of the roads report the use of wood platforms costing from 6 cents to 14 cents per sq. ft., the average being 10 cents per sq. ft., and the average life 10 years. Three roads report the use of brick platforms costing from 10 to 25 cents per sq. ft., with an average cost of 13 cents per sq. ft. The use of coal tar concrete was reported by four members on two different roads, and cost from 3½ cents to 14 cents per sq. ft., with an average cost of 7½ cents per sq. ft., and an average life of 13 years. Three roads use cement concrete platforms at an average cost of 14 cents per sq. ft. Nine roads use cinder platforms at a cost of 3 cents per sq. ft. Five roads use crushed stone platform. No data as to its cost.

For local stations there should be different kinds of platform to serve the different kinds of business. At stations where only light baggage was handled and a small number of passengers, the use of cinders, crushed stone or gravel might meet all demands. At stations where baggage and express matter are handled in considerable quantities some kind of platform over which heavily loaded trucks can be easily drawn should be provided. Several members criticised the use of cinders and crushed stone, as it is tracked into the coaches and stations, cutting out the floors and making more work to keep them clean. Against this is the less cost of this kind of platform. If cinders are used a suitable curb should be provided to keep them away from the rail. Cases have come under the observation of the committee where cinder platforms have been put down, filling level with the top of and against the side of rail, where in a few years the rails and spikes were so badly rusted by the sulphur and acid in the cinders that the track was unsafe for use. Where cinders are carefully rolled and made compact they make a dry platform suitable for light business and at a low cost.

Platforms where trucks are much used should have a hard, smooth surface. For this class of platforms, wood, brick, cement, and coal tar concrete can be used. The average cost of wood platforms we find to be 10 cents per sq. ft., and they last 10 years, making the cost of a wood platform 1 cent per sq. ft. per year. Brick platforms cost 13 cents per foot, with no data as to average life. Assuming this to be 12 years (which was named by one member) the annual cost would be a little over 1 cent per sq. ft. The average cost of cement concrete platforms is given as 14 cents per ft. and the durability unknown.

The average cost of coal tar concrete is 7½ cents per ft. and average life 13 years, making the cost per year $^{6}/_{10}$ cent per sq. ft. The cost of coal tar concrete as seen from the figures given is 40 per cent. less than either brick or wood. But where this is used some kind of a curbing should be provided. Wood curbing is the cheapest but will not last. Stone curbing costs about 65 cents per lineal foot in position. Cement concrete curb costs 28 cents per ft. and should be durable, although the committee could get no information as to its actual life. Taking 10 ft. as the average width of platform we find that with granite curb the cost of tar concrete platform is the same as brick. With a curbing of cement concrete the cost is 20 per cent. less than either brick or wood.

The members using tar concrete platforms report it as very satisfactory, being hard, smooth, and less slippery than any other kind except brick. Its use, however, seems to be confined to a small section of the country; and, so far as we could learn, little was known about it outside of this section. Believing it to be one of the best, cheapest, and most economical kinds of material for railroad platforms, we will give the usual manner of putting it down. First, level the ground, making it about 4 in. below the desired level of the finished platform. Cover this with a layer 4 in. thick of broken stone or very coarse gravel, or pebbles, from ¾ in. to 3 in. in diam. which have been well covered with tar. Roll this down with a stone roller weighing not less than 600 lbs., which has been smeared with crude oil to keep the tar from sticking to the roller. On this bed spread a layer of top dressing prepared in the following manner: Take clean, hard sand, such as would be used for good cement, heat this to about 250 deg. and until its moisture has been expelled. Add to this a mixture of three parts of good coal tar and one part coal tar pitch which has been heated until it boils. Stir the sand and coal tar mixture together. When both are hot, spread evenly on the prepared stones about 2 in. thick. Sprinkle over this fine sand or mica and roll to a hard, smooth surface while it is hot. Tar of good quality with a heavy body should be used. Care should be taken in heating the sand so that it will not be burned. If it does the concrete will be much injured. When carefully prepared and put down we have seen platforms which have had severe and continuous usage for more than 15 years and are in good condition yet.

This report is signed by J. B. Sheldon, New York, New Haven & Hartford; J. T. Banks, Chicago Great Western; N. H. LaFontain, Chicago, Milwaukee & St. Paul; L. H. Wheaton, Halifax & Yarmouth; W. A. Fort, Southern Ry. and A. McNab, Chicago & West Michigan.

OPERATING TURN-TABLES BY POWER.

The operation of turn-tables by other than hand power has, up to within a few years, been unknown, except possibly in certain cases where steam was used. The question of obtaining suitable power to facilitate the turning of locomotives by some motive power was brought to the front by the decided increase in the weight of locomotives during the last few years. The weight of locomotives on some of the railroads to-day is such that they cannot be economically turned by hand, not only on account of requiring too many men to do the work, but the question of turning locomotives at junctions and busy terminal points quickly is a vital factor in considering the question as to what power to adopt to turn locomotives and other rolling stock, both promptly and economically. The following table gives data of power-operated turn-tables:

DATA ON POWER-OPERATED TURN-TABLES.

Name of Railroad.	Kind of power.	No. of horse-power.	Speed of turn-table at rim of pit, feet per minute.	No. of engines turned in 24 hrs.	No. of men employed per day 24 hours.	Diameter of turn-table, feet.	Style of center-bearing used.	Power is applied to table by.	Cost of operating turn-table by hand per 24 hrs.	Cost of operating turn-table by power per 24 hrs.
C., M. & St. P.	Electric	10	200	200	2: 1 day, 1 night	56	Conical roller	Overhead switch	....	½ cost by hand.
C. & N. W.	Electric	10	220	100	2: 1 day, 1 night	70	Conical roller	Contact ring at center	....	Less than ½ cost by hand.
C., Bur. & Quincy	Electric	10	300	200	2: 1 day, 1 night	60	Conical roller	Overhead switch	$11.25	$4.69
Illinois Central	Electric	7½	207	...	2: 1 day, 1 night	66	Pivot bearing	Contact ring at center	16.44	3.00
C. & N. W.	Electric	10	226	400	4: 2 day, 2 night	60	Conical roller	Contact ring at center	13.40	13.40
L. V. R. R.	Gasoline engine	5	200	144	2: 1 day, 1 night	65	Pivot	.....	7.50	3.60
Pennsylvania	Electric	22	370	308	2: 1 day, 1 night	75	Conical roller	Contact ring at center	....	4.34
Pennsylvania	Steam	..	280	...	2: 1 day, 1 night	60	Conical roller	.....	....	4.90
Erie	Electric	15	...	140	2: 1 day, 1 night	65	D'bridge b'r'g	At center drum	*	4.56
Erie	Steam	5	218	124	2: 1 day, 1 night	65	Pivot bearing	.....	*	3.66
N. Y. C. & H. R.	Gasoline engine	5½	100	150	2: 1 day, 1 night	70	Pivot	.....	6.00	4.50
C. R. R. of N. J.	Electric	10	...	125	4: 2 day, 2 night	65	Conical roller	Overhead switch	10.80	7.00

*About twice that by power.

Tables Driven by Electric Power.—The electric motor through which the power is transmitted is generally mounted on a cast iron, wrought iron or steel frame, properly geared to a friction wheel which runs on the circular rail to the turn-table; this part of the apparatus is commonly called "donkey." It is attached by a pin joint to one end of the turn-table in such a way that the friction wheel runs concentric to the table on the circular rail. The current wires are either brought to the motor by way of an overhead switch, or by means of contact rings—one ring fastened to the center bearing, the other to the center cross girders of the table. The donkey and motor are usually covered by a small house for the use of the operator. The current is controlled by a regular street car controller. Generally the power apparatus is provided with an appropriate brake to stop the table at a given point. In some cases sand boxes are provided in the operator's house, to sand the circular rail, to prevent slipping of friction wheel.

The electrical driven turn-table of the Erie Railroad at Jersey City, N. J., differs from the above described apparatus materially; this table is provided with a regular drum and conical wheels similar to a drawbridge. The power of the motor is applied through a gear working in a circular rack around the drum. This table, we understand, is giving very good satisfaction.

Tables Driven by Steam Power.—The equipment consists, generally, of an upright boiler and engine combined, located over the circular rail, and opposite and at right angles to the center of the turn-table, resting on a frame connected with arms, extending to the table girders. The movement of the table can be obtained either by means of a friction wheel on the circular rail, or by means of a circular rack along the circular rail; the former is no doubt the most economical.

Tables Driven by Gasoline Engines.—The general construction of the apparatus is the same as that used on tables driven by electric power, except that, instead of using an electric motor, a gasoline engine is used. The engine is mounted on a wrought iron or steel triangular frame; this frame is hinged at two points to the girders of the turn-table, and supported at one point by a friction wheel on the circular rail. The engine is provided with the necessary friction clutches, speed regulators, and foot-brake. The whole is housed for the protection of the apparatus as well as the operator. Under the supporting frame a reservoir is provided containing the fuel used by the engine and a silencer to reduce the noise. A water tank is located in one corner of the house. The water is used to prevent the engine from running hot.

In the opinion of the committee no specific apparatus can be recommended for any location of turn-table; the kind of power and apparatus required or desirable depends upon the location of the turn-table with reference to electric or other power plants. If electric power can readily be obtained from the railroad company's plant or from outside parties, electricity should be employed, as it requires the least machinery, and is economically maintained. Where a special engine and electric generator would have to be provided, a steam or gasoline apparatus will, no doubt, be more economical and preferable, on account of the first cost of installing the plant, as well as the additional help required to run the engine and generator.

In considering the feasibility of drawing the electric current from an existing railroad plant or a city electric plant, attention should be given as to whether a suitable current is available at all times, including nights and Sundays. In a railroad plant, the introduction of the electric turn-table device should not be the only cause of requiring help in the engine room and boiler house, to be on hand nights and Sundays; in such case it will not prove economical to use electricity. It will also not be desirable to have to run a large central electric machine nights and Sundays on account of the turn-tables. In other words, there should be a small dynamo at the central plant for use nights, Sundays, holidays and when shops are idle. The gasoline engine, where electric power cannot be readily obtained, except by establishing a special plant, is no doubt the most economical; it consumes fuel only when operated, requires less attention than a steam plant, and is generally more adapted for work of this character. In cities the use of steam power generally necessitates employing a licensed engineer. Further, the supplying of the coal and the removal of ashes all add to the cost and trouble. The first cost of electric apparatus, 10-h.p. motor, controller, donkey, wiring, contact rings, connection of donkey to turn-table, operator's house, etc., complete, is about $1,400; the cost of a steam engine and generator will be about $1,700 additional, if a special or additional plant would have to be installed, making the total cost for an electric motor, including engine and generator, $3,100. The first cost of a gasoline engine apparatus complete, including gasoline and water reservoirs and operator's house, is about $1,000. The first cost of a steam engine plant complete is about $1,250.

The foregoing estimates are made up as follows:

First Cost.

Electrical Apparatus without special Engine and Generator:

10 h.p. motor, carriage, gearing and controller	$800.00
Wiring from power station, assuming distance 500 ft	250.00
Contact rings at center, or overhead switch frame	250.00
Labor erecting apparatus	50.00
House for use of operator	50.00
	$1,400.00

Electric Apparatus including Special Engine and Generator:

One 6½ in. x 8 in. direct connected engine	$785.00
One ten k. w. engine, type generator, including switchboard, voltmeter, etc	650.00
Foundation for engine and generator	250.00
Labor installing engine and generator	165.00
One 10 h.p. motor, carriage, gearing and controller	800.00
Wiring from generator to table and motor	100.00
Contact rings at center of table or overhead switch frame	250.00
Labor erecting apparatus on turn-table	50.00
House for operator	50.00
	$3,100.00

Steam Engine Apparatus:

Steam engine and boiler	$800.00
Gearing and friction wheel	100.00
Frame supporting engine and boiler including guide arms	200.00
Labor erecting apparatus	100.00
House for operator	50.00
	$1,250.00

Gasoline Engine Apparatus:

5 h.p. engine and supporting frame	$850.00
Erecting apparatus	100.00
House for operator	50.00
	$1,000.00

Cost of Operation.

The cost of operating the various machines per day of 24 hours, based on turning 250 engines, is about as follows:

Electric Apparatus, without special Engine and Generator:

One day and one night operator at $1.60 per day	$3.20
Cost of electric current	.60
Repairs to electric apparatus and supplies	.10
Oil and waste	.02
	$3.92

Electric Apparatus with special Engine and Generator:

One day and one night engineer at $1.60	$3.20
One day and one night operator of turn-table at $1.60	3.20
Repairs to engine, generator, motor, etc	.20
Cost of steam for operating engine, assuming that steam can be drawn from existing boiler plant	.50
Oil, waste and sundry supplies	.15
	$7.25

Steam Engine Apparatus:

One day and one night engineer at $1.60	$3.20
Wheeling coal to table for engine	.25
Coal, lubricating oil and waste	.80
Repairs to engine, boiler, etc	.15
	$4.40

Gasoline Engine Apparatus:

One day and one night engineer at $1.60	$3.20
Gasoline	.40
Oil, waste, etc	.15
Repairs to apparatus	.20
	$3.95

The economy of operating turn-tables by power depends on the weight of and the number of locomotives to be turned in a given time. On railroads where only light locomotives are required to be turned on a certain turn-table, the hand power will, no doubt, prove satisfactory and economical. On some of the Eastern railroads locomotives weighing 175 net tons, including tender, are operated; such locomotives cannot, according to actual experience, be turned economically by hand, especially in the winter time.

The committee is of the opinion that for heavy service turn-tables, some motive power should be applied for their operation. Electric power is recommended where the railroad company have their own power plant in close proximity to the turn-table, or when electric power can be purchased from outside parties at a reasonable figure. For points where electric power is not available the gasoline apparatus should be used. Steam power, while satisfactory as to performing the work, is not as economical as either the electric or gasoline apparatus. The electric donkeys are manufactured by the Milwaukee Electric Co., Milwaukee, Wis., the Westinghouse Electric Co., Pittsburgh, Pa., and probably by other electric manufacturing concerns. The gasoline engine apparatus is manufactured by Fairbanks, Morse & Company, Chicago, Ill.

This report is signed by F. E. Schall, Lehigh Valley; J. E. Greiner, Baltimore & Ohio; B. F. Pickering, Boston & Maine, and Onward Bates, Civil Engineer, Chicago.

WATER STATIONS.

This report consists of replies to a circular letter covering details of construction. In reference to the use of steel tanks for water stations, the committee says, in part:

Special efforts have been made by the committee to get special information in reference to the use of iron for water tanks. The information received has been very favorable, and leads the committee to believe that the time is not far distant when nothing but steel or iron water tanks, and their substructures, will be in general use on the majority of roads. A great deal of stress has been laid on how these tanks should be painted on the inside and at the same time keep them in service. This is an impossibility, and cannot be accomplished. The use of paint on the inside of a tank, where it is at all times kept filled with water is useless, and we believe that no good results would follow if it were possible to keep it painted. As an example, we can only refer to the locomotive tanks which are constantly in use and are never painted on the inside. No doubt any of us can call to mind locomotive tanks that have been in service 30 or 40 years and are in a good state of preservation so far as rust from the inside is concerned. The use of wood for water tanks is fast becoming short lived. It is true wooden tanks are still standing that were put up in 1880 and are good yet for two or three years, yet on the other hand tanks that were put up in 1886 and 1888 must be renewed in the next two or three years. This is attributed to the defective white pine timber that is being used for structures of this kind. While the use of cypress is longer lived than white pine, yet it will be but a short time before this timber will be exhausted and the use of iron will have to be substituted. The committee tried on several occasions to get information in reference to fir timber for this class of work, but no information could be had in that direction.

The Pittsburgh, Bessemer & Lake Erie reports that three steel tanks, 21 ft. x 21 ft., have been built, and they have been in service three years. No trouble has been experienced from freezing. The Chicago, Rock Island & Pacific also reports no trouble from freezing. The committee suggests that the danger of accumulations of ice at the top of steel towers falling and damaging the tower can be avoided by riveting cross-stays in the tower which will prevent ice from raising and lowering with the water. Reports from a tile tank on the Pittsburgh & Western are favorable to that form of construction.

This report is signed by A. S. Markley, Charles Carr, W. O. Eggleston, A. J. Austin, A. Shane.

IS IT BEST FOR RAILROADS TO ERECT THEIR OWN STEEL STRUCTURES?

Traffic is maintained during erection by all roads, whether erection is done by company forces or by the builders', but it is conceded that traffic is very much better cared for by the companies' forces. There is additional expense incurred in nearly all cases where erection is done by the builders' because of the companies' forces being obliged to care for the falsework. It appears to be almost a universal custom where erection is let to the builders that the railroad company furnish and put in and maintain falsework; maintenance officials not wishing to trust the maintenance of such structures to any but their own experienced men. Transportation officials offer even more serious objections because of the greater delays to their trains. It seems to be an uncontrovertible fact, arrived at by long experience, that this feature of the business is very much better taken care of by the railroad companies' men than by the builders' men.

The cost of erection varies greatly, and this condition is brought about from the fact that contracts when let embody various conditions. The same difficulty is experienced by company forces because of the manner in which accounts are kept. The cost of erection has been given when done by builders variously at from $3.50 per ton to $40 per ton. When the same work is done by railroad company forces it is said to cost from $5 per ton to $20 per ton. Taking these figures for a basis it would seem to be very much cheaper for erection of these structures to be done by the railroad companies.

In pursuance of information it is interesting to note the evident lack of uniformity in handling this class of work. One road reports that contractors are not used on their lines at all for any purpose, everything being done by railroad company's forces. One other road does all its own iron and steel erection, but in other lines of bridge work contractors are employed. Both of these roads are among the largest in the country. Another large road does all its own erection, but considers if a great amount of work was to be done it would be cheaper to allow the builders to do erection, while another equally large road considers it best to erect its own steel if a large quantity is to be erected, which would justify procuring the necessary erection tools.

Great stress is put upon the necessity for special tools for erection of steel structures. While it is a fact that special tools are required for this purpose, many of these appliances can be used to good advantage and with economical results for other purposes when not in use for erection. On some railroads it has become a recognized fact that when any difficult job is to be done it must be relegated to the bridge department.

The committee is of opinion that all bridge erection can best be done by the forces of the railroad company. Such tools and equipment as is necessary for erection of steel bridges should be a part of the equipment of all bridge and building departments, and men should be educated in their use, in consequence of having to maintain such structures after erection. A bridge force should be competent to do all kinds of bridge work, and the usual repair force should be available as a nucleus for a larger force for erection purposes, should occasion require.

This report is signed by O. J. Travis, Illinois Central; F. S. Edinger, Southern Pacific; A. B. Mannering, Missouri, Kansas & Texas; J. McIntyre, Erie R. R., and A. Zimmerman, Colorado & Southern.

COMPRESSED AIR; ITS USE AND ADVANTAGES.

The writer having a large amount of bridge work to do (principally strengthening) asked for a compressed air plant sufficiently extensive to test its practical utility. The request was granted, and the result has proved the move a wise one. That others, with similar work, might profit by the experience gained, I will endeavor plainly and practically as possible to give a description of the necessary plant and tools for an outfit for general bridge and field work. It will be noted that the plant I describe is one operated by steam, and some will no doubt ask, Why not use a gasoline plant? This, of course, is optional, but the writer prefers the steam, reason for which it is not necessary to state in this paper.

The plant I have in operation consists of an air compressor, capacity 95 ft. of free air per minute, a 25-h.p. boiler, a water tank of 300 gals. capacity, and an air receiver of 150 lbs. capacity. This plant is mounted on a car. When in use the car is placed on a side track as near as possible to the bridge on which the work is to be done, and ¾ or 1-in. wrought pipes are then connected to the air receiver or reservoir, and run to the bridge. At intervals along the bridge, hose connections and globe valves are placed in the pipe line for connections to various tools. The tools ordinarly used consist of drills, riveting hammers and chipping hammers; forges can also be arranged to be operated by the air. In operating, care must be taken to occasionally blow out this pipe to prevent the accumulation of rust or dirt. Good wire-bound rubber hose should be connected to the pipe for tool use, as flexibility is required for moving tools from point to point.

In locating the plant for operation, it is necessary to consider the water supply, as considerable of this is needed, not only for the boiler, but for the cooling of cylinders of the air compressor. This is just as important where gasoline or gas engines are used. For this purpose I have installed with the plant a small steam pump which can be set up at the nearest stream, spring, or well, and 1-in. pipe run to the car on which the compressor is installed, and by this means an ample water supply can be furnished at small cost. Steam for operating this pump is supplied from the boiler operating the compressor.

Of the tools used, there are a number of various manufacture in the market, all of which possess more or less merit. The kind I have in use are as follows:

Little Giant air drill press.

Boyer short stroke riveting hammer, No. 0.

Boyer long stroke riveting hammer (the new long stroke).

Boyer chipping hammer, No. 1.

Boyer yoke hammer.

(For ordinary work would not recommend the purchase of the latter.)

In the drill press, Morse twist drills are used, the shanks of the various sized drills being made to fit the press. For chipping hammers, cape chisels, etc., blanks are furnished by the manufacturers to be made up into the style necessary, or they can be made in one's own shop. The style of tools necessary will be developed by the class of work to be done.

As before stated, the plant should be placed as close to the work as possible. This is, however, only as a matter of economy in the running of pipe. I have operated it as far as half a mile from the bridge on which work was done. A plant such as I have described, exclusive of the air pipe for conveying air from plant to bridge, will cost about $1,600.

The cost of operating a plant of this character depends in a great measure on the foreman in charge of the work. The man in charge of the plant should not only see to the proper firing of the boiler and running of the compressor, but should do the drilling, or assist in same, for all work such as plates, angles, etc., that can be done at the car. By doing work of this kind, the actual expense of the man for running the plant will be reduced at least one-half. The amount of coal used will approximate about one-quarter ton per day. Ordinary repairs to the compressor can be made by the gang in charge. In the 18 months that our machine has been in use the repairs have been very slight, and machine is still in excellent condition. For the drills and riveting hammers the expense is heavier, but as extra valves are supplied, and of which at least two should be carried in stock, there need be no delay in loss of tools while waiting for repairs, as the workmen soon become skilled in the handling of the tools, and can make all ordinary repairs, such as replacing valves, etc.

In the use of the air drill we find that two men can, under ordinary conditions, drill from five to six holes to one by hand by the same number of men. The drills can be used under ordinary conditions wherever hand drills can be used. In riveting two men will, under ordinary conditions, do the work of three men with hand tools. As is well known by all bridgemen, we use, as a rule, three men besides the heater, for riveting, one to hold on, two to drive. With the pneumatic hammer, one to hold on and one to drive is all that is necessary. An additional advantage in this tool is that any intelligent helper can be taught the use of it by a skilled foreman in a day, whereas, under the old hand method, skilled riveters must be employed. Of course this method like the hand driving must be watched to avoid loose rivets. My experience in this has taught that up to ⅞-in. rivets, this method is not only effectual, but highly economical.

In the handling of this plant it must not be overlooked that after drilling and riveting on large jobs are completed, there is still another use for the compressor. It is a well known fact that in painting bridges, one, if not the most expensive, is the cleaning of the metal before applying paint. By having a sand blast machine, of which there are a number in the market, attached to the outfit, bridges can be cleaned in not only less time but much better. Personally, I have not used a machine of this kind, but have seen it used elsewhere, notably the 155th street viaduct, New York City. I am now in communication with a manufacturer of sand blast machines with a view of adopting it.

In conclusion I have a few suggestions to offer:

1. That anyone having a large amount of field work in which there is considerable field drilling and riveting to do, should beyond doubt install a plant of this kind.

2. That all who are inclined to doubt and who have sufficient work to justify it, should either try the method or see it in practical operation before condemning it.

3. That if the manufacturers would reduce their apparent exorbitant prices for drills, hammers, and repair parts, many more would be in use.

4. That as this is an age of advancement and progressiveness, and one in which no man can remain inactive, and at the same time keep abreast of his fellow-workers, it behooves all to watch carefully the improvements in their special line, and grasp all possible opportunities for the economical handling of their work, as well as relieving their employees of unnecessary laborious duties.

This is a special report by G. W. Andrews, Superintendent Bridges and Buildings, B. & O. R. R.

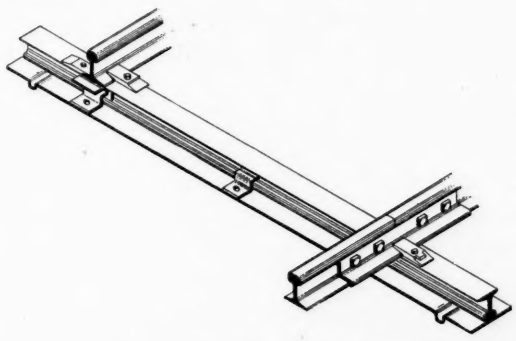
The Roadmasters' and Maintenance of Way Association.

Last week we published a synopsis of the proceedings of the nineteenth annual convention of this Association, held in Washington, D. C., Oct. 8, 9 and 10, with abstracts of committee reports. The only paper of which we gave no discussion was "The Use of 45-Foot Rails," by F. R. Coats, presented at the last session of the convention. In the discussion Mr. A. Morrison spoke of his experience on the Lehigh Valley with rails 45 ft. long. He found it cheaper to lay and maintain a 45-ft. than a 30-ft. rail and was able to keep the alignment and surface good. It had been the practice to curve 30-ft. rails on 5 deg. curves before laying; he found this unnecessary with 45-ft. lengths. He agreed with Mr. Coates that joints could not be as well maintained as with 30-ft. rails.

Mr. M. W. Thompson (Pennsylvania R. R.) spoke at length of his experience with 33-ft. and 60-ft. rails extending over a period of 6 or 7 years. He found that 33-ft. rails behaved much like rails 30 ft. long—at least, no difference was apparent. Sixty-foot rails proved unsatisfactory, in fact so much so that the use of rails of that length has been practically condemned by the Pennsylvania Railroad, while 33-ft. lengths have been ordered on a large scale; possibly 45-ft. rails will also be tried to some extent. Speaking of the trouble with 60-ft. rails Mr. Thompson said no special trouble was found on straight track where the surface was well maintained; but on grades of 20 and 30 ft. and more to the mile, the creeping was decided and difficult to prevent. Even with two and three fastenings a rail would bunch considerably. The irregularity in spaces at joints was especially noticeable. In zero weather he had found spaces from ⅝ in. to ⅞ in., and bolts bent. Henry Ware (B. R. & P.) said that on his road he had 11 miles laid with 45-ft., 80-lb., rails with mitred joints and six miles with square end joints. In the former case he had removed but two rails in six years (from battered ends), while with the six miles he had had no trouble; he found he was able to maintain a better track at the same cost as for 30-ft. rails.

Steel Ties from Old Rails.

Last May 150 steel ties were put in use on the Lake Shore & Michigan Southern Railway in the south main track on a curve 2½ miles east of Sandusky, Ohio. The view from a photograph shows the track with steel tie and the track with wooden tie, side by side. The photo-



Cross Tie Made of Old Rail.

graph, of course, proves nothing except that the steel-tie track is neat in appearance. This tie is invented and patented by Mr. C. Buhrer, Roadmaster of the Sandusky Division of the Lake Shore. It is made of old rails turned upside down. Below the rail a steel plate is attached, as shown in the line drawing, this plate being ¼ in. thick x 8 in. x 8½ ft. The rail used is 65 lbs. per yd. The clamps for holding the rail to the tie are also shown in the line drawing.

It is proposed now to modify this construction by rolling out the head of the rail to a width of about 8 in. to form the base of the tie and thus to dispense with the extra plate now used underneath. It is proposed to run the rail through a specially designed machine, which will split the head before it is rolled out.

These ties were put in place of wooden ties of about twice their depth. Consequently, it was necessary to form a new bed of 3 or 4 in. under each steel tie by tamping. Mr. Buhrer says that this tamping was carefully done and no difficulty has been found in keeping the track to true surface and line. "Indeed, less labor was spent in surfacing this section of track laid with steel ties than the adjoining track of similar length laid with wooden ties. At least 30 per cent. should be saved in maintenance with this class of steel tie." No statement appears as to the cost of these ties in track, and, of course, they have not been in long enough to prove much about the saving in cost of maintenance.

The reader who has followed this steel tie question any time will remember that the Pennsylvania Railroad some 15 years ago, or thereabouts, put in two or three miles of steel ties, brought over from England, and made to the London & North Western standard. Those ties developed a difficulty which we should expect to find with Mr. Buhrer's tie, namely, that the track was moved sidewise bodily, ties and rails together. This was thought to have been because the tie had little frictional resistance to movement in the ballast. This particular difficulty does not exist in steel ties of the Post type, which are stamped out of steel plates and flanged down at the ends, as well as at the sides, making a cavity underneath the tie which holds a considerable body of ballast. Of course, we are not offering any positive criticism of Mr. Buhrer's tie, but merely calling attention to what, as we remember it, was found to be a difficulty with a tie of essentially the same type.

The Awards at Buffalo.

Below is a list of those awards in the Transportation Division of the Pan-American Exposition which, presumably, will be of most interest to the readers of the *Railroad Gazette*. This Division was very large and included all known means of transportation, but we have cut out from the list, as printed below, practically everything that does not belong to railroading. The organization of the Department of Awards was such that the Divisional Jury did not control the final findings and therefore anomalies which may appear in the list below are not to be charged to that Jury. The Divisional Jury reported to the Superior Jury, which Superior Jury contained some elements that never should have been included. After revision by the Superior Jury the Directors of the Exposition had final authority.

GOLD MEDALS.

Baldwin Locomotive Works, Philadelphia, Pa., steam and electric locomotives.
Brooks Locomotive Works, Dunkirk, N. Y., locomotives.
Bucyrus Steam Shovel Co., South Milwaukee, Wis., steam shovel.
Brill Co., J. G., Philadelphia Pa., cars and trucks for electric roads.
Consolidated Railroad, Electric Light & Equipment Co., New York City, car light by electric power from the axle.
General Electric Co., Schenectady, N. Y., electric traction apparatus and system.
Gas Engine & Power Co. and Charles L. Seabury & Co., Morris Heights, New York City, launches, engine models.
Gould Coupler Co., Depew, N. Y., car light by electric power from axle.
Howard Iron Works, Buffalo, elevators.
International Navigation Co., Philadelphia, Pa., models of steamships.
Lidgerwood Mfg. Co., New York City, coaling ships at sea.
Lidgerwood Mfg. Co., New York City, electric ship's winch.
New York Car Wheel Works, Buffalo, cast iron car wheels.
Pressed Steel Car Co., Pittsburgh, Pa., steel cars.
Roebling's Sons Co., John H., Trenton, N. J., general exhibit in transportation.
Safety Car Heating & Lighting Co., The, New York City, gas lighting for cars and buoys.
Standard Railway Signal Co., Troy, N. Y., railroad signal apparatus.
Schenectady Locomotive Works, Schenectady, N. Y., locomotives.
Union Switch & Signal Co., The, Swissvale, Pa., block signaling and interlocking apparatus.

SILVER MEDALS.

Bierbaum & Merrick Metal Co., Buffalo, "Ideal" trolley wheel.
Consolidated Car Heating Co., Albany, N. Y., heating apparatus for steam and electric cars.
Goodwin Car Co., New York City, cars.
Gold Car Heating Co., New York City, car-heating apparatus.
Gould Coupler Co., Depew, N. Y., car couplers and platforms.
Hamburg-American Line, New York City, models of steamships.
Lackawanna Railroad Co., New York City, composite train.
McGuire Mfg. Co., Chicago, Ill., car-track sweeper.
McGuire Mfg. Co., Chicago, Ill., trucks and appliances for electric cars.
New York Air Brake Co., The, New York City, New York air-brake.
Pennsylvania Iron Works Co., marine motors.
Richmond Locomotive Works, Richmond, Va., compound locomotive.
Standard Steel Works, Philadelphia, steel tires and wheels and frames.
Sterlingworth Railway Supply Co., Easton, Pa., rolled steel coal car.
Simplex Railway Appliance Co., Hammond, Ind., simplex bolsters for freight cars.
Safety Car Heating & Lighting Co., The, New York City, steam heating for railway cars.
The North-Western Line, Chicago, model railway ticket office.
Ferro-Carril de Copiapo, Copiapo, locomotives.
Maestranza del Ferro-Carril de Copiapo, Caldera, locomotive cylinders.

BRONZE MEDALS.

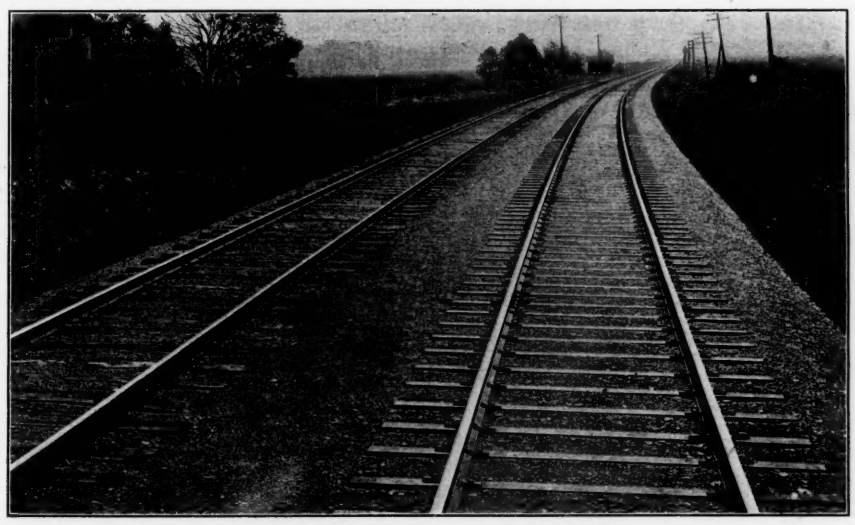
Buckeye Malleable Iron & Coupler Co., The, Columbus, Ohio, freight car couplers.
Continuous Rail Joint Co. of America, Newark, N. J., rail joints for steam and street railroads.
Chisholm & Moore Mfg. Co., Cleveland, Ohio, American standard railroad joint.
Goodwin Car Co., New York City, Goodwin cars.
Holland-American Line, New York City, steamship model.
Merchants Despatch Transportation Co., New York City, refrigerator freight car.
Merritt Air Brake Co., New York City, Merritt air-brake (for street cars).
Noera Mfg. Co., Waterbury, Conn., steel A. brass oilers, pumps, wrenches and cyclometers.
Simplex Railway Appliance Co., Hammond, Ind., Susemihl roller side bearing.
Weber Railway Joint Mfg. Co., New York City, rail joints.
Ferro-Carriles del Estado, Santiago, bogie truck for passenger car.
Ferro-Carriles del Estado, Santiago, locomotive cylinder.

HONORABLE MENTION.

Edwards Co., The O. M., Syracuse, N. Y., Edwards railway devices.
Light Inspection Car Co., Hagerstown, Md., light-inspection cars.
Morris Electric Co., New York City, wheel-truing brake-shoe.

JURORS.

H. G. Prout, Chairman; Arthur V. Abbott, William L. Aughinbaugh, Albert C. Bostwick, R. C. Carpenter, J. M. Carson, Jr., Frederic A. Delano, David Porter Heap, C. H. McLellan, Henry M. Paul, Cecil H. Peabody, George D. Shepardson, Ambrose Swasey, J. Elfreth Watkins.



Lake Shore Tracks with Wooden and Steel Ties.

A Dreadful Train Wreck in Roumania.

In far-off Roumania, on the borders of civilization, occurred, Sept. 20, one of most fearful of railroad disasters, due, if we may trust a telegram to a German newspaper, to the fact that a brakeman on a passenger train was scared out of his wits by seeing danger signals on a following train coming down a steep grade. This latter train consisted of 16 tank cars filled with petroleum, on which the brakes failed to hold. It was following an express composed of two first-class and two second-class cars and one sleeping car.

When the rear brakeman of the express saw the lights of the approaching oil train he was so demoralized that he pulled the cord which put on the emergency brake, which brought the train to a stop in a deep cutting, and in a moment the oil train struck it with terrific speed, with the result that both trains were shattered, with the exception of the locomotive of the express and the two rear cars of the oil train.

The broken tank cars filled the cut with a lake of oil which immediately took fire. The sides of the cutting were so steep that the few able to get out of the cars for the most part were unable to get out of the cut. A sleeping car official and his wife did succeed in getting to the top of the cut, and there saw their daughter burn before their eyes. A millionaire from Cracow succeeded in getting out of the car, but caught his foot between two timbers so that he could not move. He begged an engineman to cut his foot off, but before he could be reached he was wrapped in flames. The fire burned far into the next day, killing all the trees for 100 rods around, making the sides of the cut almost brick, and leaving nothing of the two trains but a heap of bent iron, except the express engine and tender, which succeeded in cutting loose and running on to the Danube (Turn Severin) for help. The victims numbered 34, of whom 18 were trainmen. Several others were injured.

The Prussian State Railroads during the current year are prepared to "muster out of service" (which is a pretty good expression) 420 locomotives and 430 passenger cars, their places being more than made good, of course, by new and generally better ones.

The Manhattan Terminal of the Brooklyn Bridge.

On the 8th of October the Board appointed to consider the improvement of the Manhattan terminal of the Brooklyn bridge handed its report to Mr. Shea, the Commissioner of Bridges. The extracts which follow (about one-third of the text) give the essential points of the report:

PRELIMINARY.

The Board was appointed under Chapter 712, Laws of 1901 of the State of New York (known as the "McCarren Act") entitled "an Act to relieve the congestion and facilitate the traffic on the New York and Brooklyn Bridge and to improve and extend the footpaths, roadways, railway tracks and other facilities for the use of pedestrians, vehicles, and railway passengers on the westerly or Manhattan terminal of said bridge." In May, shortly after this Act became a law, you appointed the Board of Experts authorized by this law to advise you as to the means of carrying the law into effect, and to determine the character of the improvements called for. This Board consisted of Messrs. T. C. Clarke, M. Am. Soc. C. E.; Alfred P. Boller, M. Am. Soc. C. E., and Henry G. Prout, M. Am. Soc. C. E. The Board at once organized by the election of Mr. Clarke as Chairman and Mr. Prout as Secretary.

In June Mr. Clarke died, and on July 16 you appointed Mr. Samuel Whinery, M. Am. Soc. C. E., to fill the vacancy in the Board, having requested the surviving members to nominate Mr. Clarke's successor. Mr. Boller was elected Chairman of the reorganized Board.

Early in the study of the subject it became apparent that it is not possible to greatly increase the capacity of the bridge without largely rebuilding it, and that to deal intelligently with the situation at the bridge terminal involved a broad consideration of the subject of transportation between New York and Brooklyn. We have therefore proceeded with our work in conformity with that view.

CONTROLLING PRINCIPLES.

(3) No satisfactory permanent relief for the congestion at the terminal of the bridge can be provided or hoped for, except through the completion of the new bridges, now under way; these when opened and properly connected with the down town district will divert travel from the old bridge, and thus reduce the burden it now carries.

(4) Any general plans for relieving the present conditions should contemplate not only improving and increasing the capacity of the present Manhattan terminal, but should make it possible and practicable to diminish the pressure at the terminal by extending the bridge car and elevated tracks so that a part of the mass of people can be handled at stations other than the bridge terminal.

(5) The greatest measure of utility in serving the public and relieving the present bridge will be secured by connecting it with Bridges Nos. 2 and 3 in such a manner that the bridge trains may operate in both directions in a circulating system embracing the three bridges.

(6) Pending the opening of the new bridges measures should be taken to utilize, as far as possible, the full capacity of the old bridge, and to make such improvements at its terminal as will relieve the congestion and discomfort to the greatest possible extent.

(7) To relieve the congestion at the terminal dependence must be placed, not so much on increasing its capacity as on diverting from it a part of the travel to other stations, thus virtually converting it from a terminal to a way station. The circulating system of bridge trains having way stations on the connecting roads will be an important factor in accomplishing this purpose.

(8) Since a large part of the crowds that now use and will continue to use the bridge and terminal come from the dense business district south of the bridge, some provision should be made for intercepting and handling a part of this travel before it reaches the present terminal.

(9) In connecting the three bridges and providing other stations for handling a part of the people who now use and will continue to use the present bridge, regard should be had to making suitable connections or transfer points with the north and south transportation lines of Manhattan, to supplying some cross-town facilities in the downtown district, and to a connection with the more important of the North River ferries.

(10) No system of local loops for handling the bridge* cars west of the present platform would materially improve or increase the present bridge car service.

(11) The terminal of the trolley car service over the bridge must for the present remain in the Manhattan terminal. The trolley car tracks cannot be extended across Park Row, and its existing surface tracks. These tracks are now burdened to their full capacity, and to cross or cut into them would result in serious obstruction to both systems, and would increase the congestion at that point.

(12) The terminal trolley tracks should be so spaced as to provide ample platforms between them; passengers should be prevented from crossing tracks at grade, and incoming and outgoing passengers should be separated.

RECOMMENDATIONS.

Briefly stated, our recommendations are as follows:

(1) That an elevated road be built from the Manhattan terminus of the New York and Brooklyn Bridge along Centre street and Marion street to Spring street, and thence along Spring and Delancey streets to the terminus of Bridge No. 2; and that a branch of this Centre street line be built on Canal street to the terminus of Bridge No. 3. That the first named portion be completed by the time Bridge No. 3 shall be opened for travel. That that portion of this elevated road from the bridge terminal along Center street to Canal street be constructed with four tracks, the remainder to be double-track road. That the portion of the proposed elevated road from the existing bridge terminal to a point on Centre street north of Worth street be built at once, and a commodious station be built at Worth street, with sidings and switches north of this section for tail-switching and returning trains.

(2) That a double-track elevated road be built as soon as practicable from the Manhattan terminus of the New York and Brooklyn Bridge southward along Park Row and across Broadway to Vesey street; thence westward along Vesey street, crossing the Sixth and Ninth Avenue Elevated roads above grade to West street, and southerly along West street to the vicinity of the Cortlandt street ferry on North River. That the terminus on West street be provided with a suitable station and such extra sidings and switches as will enable trains to be returned to the bridge. That a commodious station be placed on Vesey street, between Church street and West Broadway, with connections by stairs and platforms to both the Sixth and Ninth Avenue Elevated roads. We regard this Vesey street line as very important, and it is strongly recommended; but it is independent of the Centre street line, and its omission would not affect the other improvements recommended.

(3) That the present gallery floor (second floor) of the Manhattan terminal building be converted into, and be used exclusively for, a trolley car terminal, the loop tracks to be wide apart and each track to be reached by two separate stairs from the ground floor, one for outgoing and one for incoming passengers.

Other minor recommendations follow.

ESTIMATE OF COST.

While we have not attempted to make a detailed and close estimate of the cost of the work herein recommended, we assume that you will desire to have an approximate estimate of what, in our judgment, it would cost to carry out the extensions, changes and improvements we have recommended, and we submit the same herewith. Our estimate of damages to property along the line of the proposed elevated extensions is predicated on the experience of the Manhattan Elevated Railroad, but it is necessarily little more than a rude guess:

Cost of the Centre street elevated extension, complete, including three stations and property damages.....$1,773,000.00

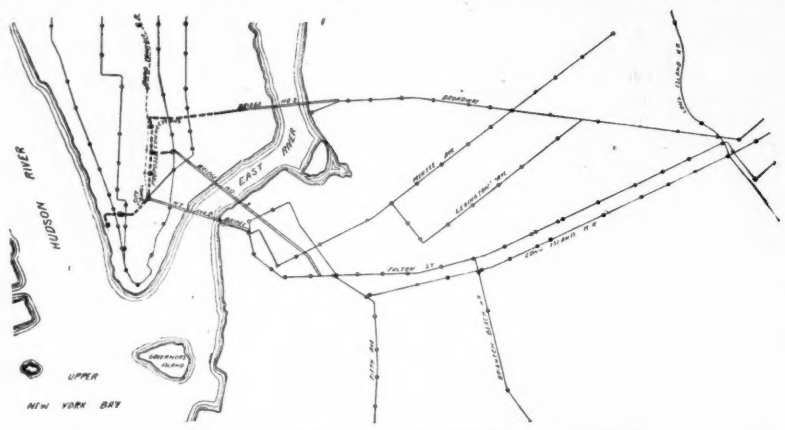


Fig. 2.—Sketch Map showing the Relation of the Brooklyn Elevated Railroads to the East River Bridges.

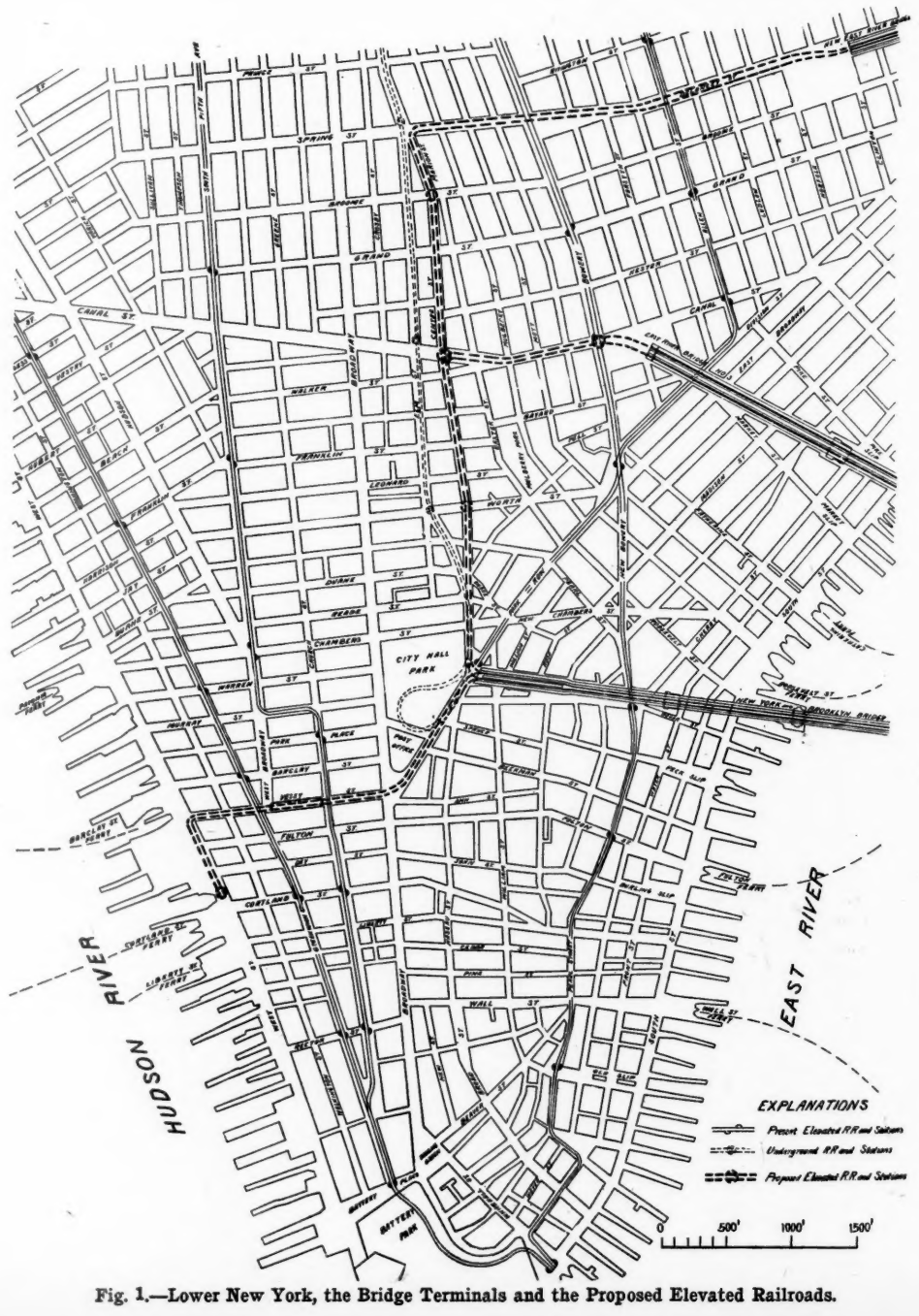


Fig. 1.—Lower New York, the Bridge Terminals and the Proposed Elevated Railroads.

* "Bridge cars" is used in this document to mean the cable and elevated railroad cars; the term "trolley cars" explains itself.

Cost of the Park Row, Vesey street and West street elevated extension, including two stations and property damages	$722,900.00
Cost of all changes and additions to the Manhattan terminal	200,000.00
Cost of curb between trolley tracks and roadway entire length of bridge, and widening roadway at the existing offsets	6,500.00
Grand total	$2,702,400.00

ELEVATED ROAD CONNECTING THE THREE BRIDGES.

A glance at the map of Greater New York (See Plate No. 2) will disclose that a large part of the residential portion of Brooklyn and Queens boroughs is to the north of the existing bridge, and of this territory a considerable part is nearer to the proposed Brooklyn terminal of Bridge No. 2 than to the present bridge. It will also be seen that with suitable transportation facilities from the Manhattan terminal of Bridge No. 2 the distance to City Hall Park, Manhattan, is rather less by this bridge than by the present bridge for all the territory along and north of Broadway in Brooklyn, as well as for the region east of East New York avenue. Taking a point at the intersection of Broadway and East New York avenue, in Brooklyn, the distance via Broadway (Brooklyn), Bridge No. 2, Delancey street and Centre street, to City Hall Park, Manhattan, is 6.36 miles, while from the same point, via Fulton street and the existing bridge the distance is 6.51 miles. It will be also observed that Bridge No. 3 is so near to the present bridge that with equally good transportation facilities for crossing No. 3 and reaching City Hall Park from its Manhattan terminal neither the distance nor the time consumed is materially greater than by the present bridge. Thus from the intersection of Fulton street and Fatbush avenue the distance to the City Hall Park by Bridge No. 3, Canal and Centre streets, is 2.69 miles, while by Fulton street and the present bridge the distance is 2.25 miles, and, assuming an average speed of 12 miles an hour, the time difference between the two routes is about 2¼ minutes.

It is therefore safe to conclude that, with the two new bridges opened and supplied with transportation facilities so that through trains over them would land passengers at the City Hall Park, in Manhattan, a material part of the travel that is now forced over the old bridge would use the new bridges.

Our plans contemplate that the proposed connecting elevated road on Centre street shall be built with four tracks from the present bridge terminal to Canal street, and the remainder to be double-track road. The scheme of operation that we have in mind, and which we believe would be adopted, provides that trains from Brooklyn, by way of the new bridges, would return by the present bridge, while those crossing by the present bridge would return by one of the new bridges, thus establishing a circulating system in both directions. With ample stations on the connecting elevated road at suitable locations, say at Worth street, Canal street and Broome street, a very considerable part of the travel over the three bridges would be taken on and landed at these stations, thus relieving to that extent the congestion at the terminal of the present bridge.

The elevated double-track road from the bridge terminal through Park Row and Vesey street to West street, with its terminal in the vicinty of the Cortlandt street ferry, will be a convenience to passengers between many New Jersey points and Brooklyn, and its station on Vesey street, between Church street and West Broadway, will provide easy transfer between the Sixth and Ninth Avenue Elevated roads.

Its most important function will, however, be to take up and deliver passengers who now use the terminal station, at the commodious Vesey street station, thus still further reducing the congestion at the bridge terminal. This Vesey street station will be nearer to and can be more conveniently reached by many of the people in a dense business district than the present terminal station.

The building and use of the connections and extensions will make unnecessary the tail-switching system at the terminal, and will thus make possible the use of five-car trains, which, being fed from the extensions, can be despatched at intervals of 45 seconds should it be decided that the strength of the bridge, in its present condition, or as it may be reinforced, is sufficient for longer trains, they can be readily operated.

If, for any reason, it shall be thought desirable to have tail-switching facilities near the bridge terminal, as for local trains, the necessary switches and tracks can be provided along either of the elevated extensions outside the building.

The practical effect of these extensions, and the circulating system of trains over the three bridges, will be to convert the present station from a terminal to an important way station, resulting in a great reduction of the number of passengers, which, as a terminal station, it would continue to receive.

THE TROLLEY CAR TERMINAL.

As outlined briefly above we recommend the use of the gallery, or second floor, of the present building for a trolley car terminal.

To supply each trolley track there are two pairs of stairs from the street level floor to the trolley floor—one for passengers going to and one for passengers alighting from the cars. It is intended that the cars shall stop at the northerly end of the loops to discharge their loads and will then move to the southerly ends of the loops to take on their loads, as they usually do now. The tracks will be separated by fences, and a longitudinal fence will separate incoming from outgoing passengers, as shown on the plans.

The advantages which this general plan offers, and the objections to it may be briefly stated:

ADVANTAGES.

(a) It will become possible to separate entirely the incoming and outgoing passengers. Experience has proved that this is necessary to the successful handling of great crowds. The satisfactory working of the bridge car system at the terminal is largely due to the employment in a very admirable manner of this expedient.

(b) It provides liberal platform room for each track. The available area of platform space for each track is about 2,000 sq. ft.

(c) It can be carried out on the present property of the city, and within the present terminal building. The purchase of additional real estate in the immediate locality in quantities that would allow any practicable enlargement of the terminal would be very expensive, and probably a long time would be required to get possession of it.

(d) It leaves the ground floor of the terminal unobstructed by tracks, and after the necessary stairways are built there will remain ample room for commodious passageways to and from all parts of the bridge.

(e) It effectually prevents passengers from getting off or on cars on the roadway alongside the terminal station.

(f) In short, this plan seems to provide an efficient remedy for all the more objectionable and dangerous features of the present plan. It makes unnecessary and impossible the crossing of tracks and the crowding of all the trolley travel into a limited space, obviates nervous shock to the weak, timid and aged, and avoids the principal sources of danger incident to the present plan.

OBJECTIONS.

(a) It confines the track loops to their present dimensions, with curves of present radius.

(b) The carrying out of the plan will reduce the width of the roadways at the terminal to that necessary for a single line of vehicles. Practically the same condition prevails now. The cars occupy the tracks so continuously during the greater part of the day that it is impossible for vehicles to use any part of them.

(c) The elevation of the trolley tracks to the second floor will prevent physical connection between these tracks and the surface tracks on Park Row.

(f) It is said that the public would strongly object to being compelled to climb stairs to reach trolley cars, and that it would in preference cross a number of tracks, as is necessary at present. The average lift of these trolley car stairs would be about 12½ ft. only, not much greater than that of ordinary residence stairs, and the exertion involved would not be great. Even if people preferred to incur the dangers of the present situation rather than to climb stairs, they should not be allowed the choice. Appliances to insure the safety of the public are often inconvenient to some, but they are, nevertheless, enforced, as they should be.

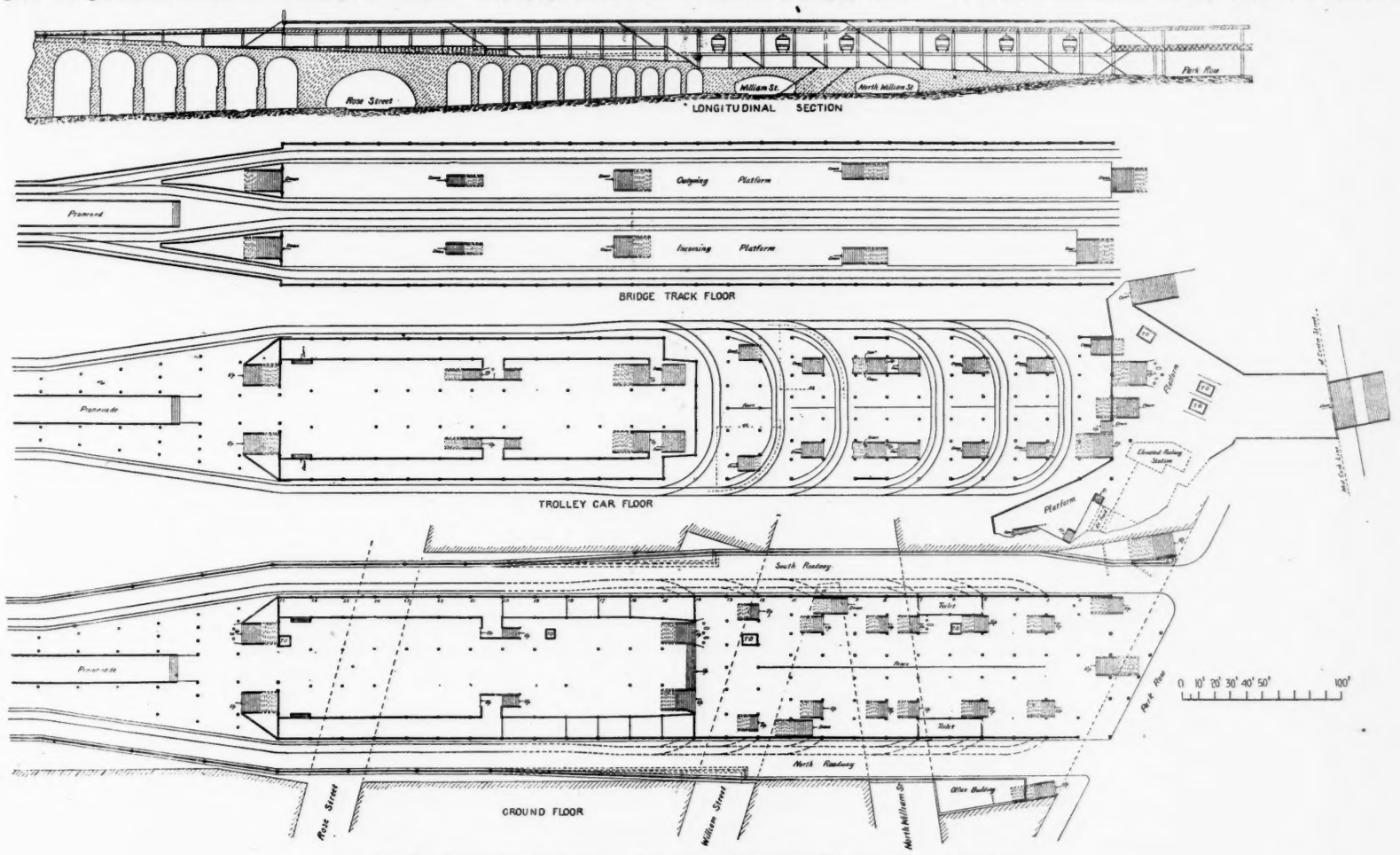


Fig. 3.—Proposed Plan for Disposing of the Trolley Car Tracks—Brooklyn Bridge.

SOME GENERAL CONSIDERATIONS—PRESENT CONDITIONS.

A brief review of the conditions now found at the Manhattan terminal of the bridge seems important for the more perfect understanding of the recommendations.

Volume of Travel.—An accurate count of the travel both ways on the bridge trains and on the trolley cars during 24 hours on Oct. 31, 1900, gave the following result:

Number of people carried by bridge trains	146,214
Number of people carried by trolley cars	129,609
Total	275,823

If to this we add a reasonable estimate of the number crossing by the carriage-way and by foot (neither of which were counted) it is safe to conclude that on that day not less than 290,000 people crossed the bridge, and therefore passed through the Manhattan terminal. So far as can be judged the travel on that day was only normal for that period of the year, and there were doubtless many

days when that number was exceeded in the regular course of travel. There are no exact data as to the number of persons crossing the bridge during the whole year, but we may estimate the number approximately from the experience of former years, when the travel was counted monthly, and in this way we arrive at the conclusion that the number crossing the bridge in the year 1900 was not less than one hundred millions. When it is remembered that this number exceeds by 30 per cent. the whole population of the United States at this time some idea may be formed of the enormous volume of travel.

From statistics before us we are warranted in stating that no other bridge or railroad terminal in the world handles half as many people daily or yearly as does the Brooklyn Bridge. The number of people handled at the Grand Central station at Forty-second street in the year 1899 is stated to have been 14,000,000, which is less than one-seventh of the number handled at the bridge during the year 1900.

In the absence of an actual count, the volume of travel carried daily by the bridge during the present month of October may be conservatively estimated as follows (exclusive of employees and drivers):

Carried by bridge cars	150,000
Carried by trolley cars	135,000
Carried by other vehicles	2,500
Foot passengers	12,500
Total per day	300,000

The difficulty of making proper provisions for this enormous travel is greatly increased by the circumstance that a large part of the daily travel is concentrated into a few hours during the day. Thus of the 275,823 people who crossed by the bridge and trolley cars on Oct. 31, 1900, 72,000, over 26 per cent. of the whole, crossed between the hours of 7 to 8 a.m. and 6 to 7 p.m., or in two hours, and 138,000 people, or about 50 per cent., crossed during the four busiest hours of the day. In other words, nearly one-half the daily travel over the bridge is concentrated into one-sixth of the 24 hours.

In view of these facts, the congestion of travel at the bridge terminal is not surprising, and great credit is due to the management for the skill with which the enormous crowds are handled with comparative safety, with facilities inadequate for the purpose.

Capacity of the Bridge.—It may be accepted as a fact that the maximum safe carrying capacity of the bridge has about been reached. The Chief Engineer and Superintendent of the bridge informs us that the maximum load that can safely be imposed upon the bridge will be reached when the hourly service over the bridge amounts to 300 trolley cars in each direction at a speed of about eight miles an hour, and 320 bridge and elevated cars in each direction at a speed of 12 miles an hour, in addition to the usual roadway vehicles and the foot passenger service.

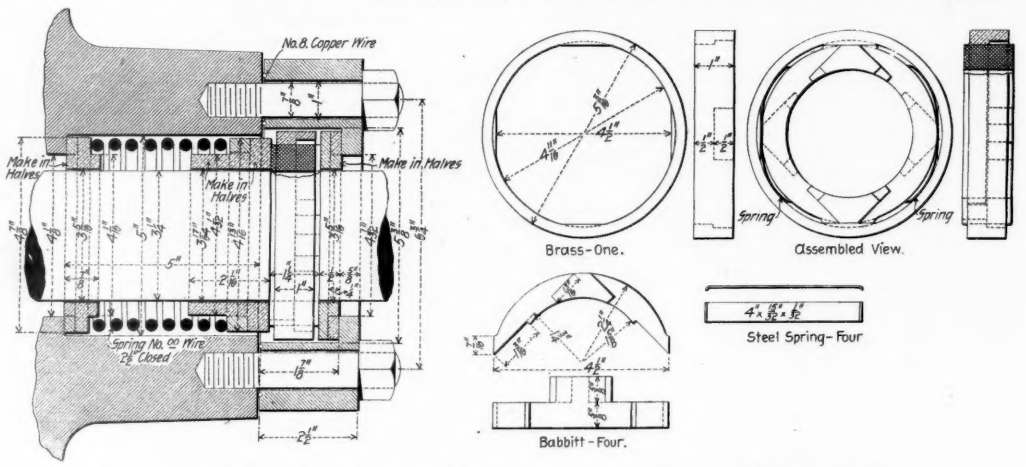
The present service over the bridge during the rush hours amounts to about 260 bridge cars and 240 trolley cars per hour in each direction. It will be seen, therefore, that the bridge car and trolley car service cannot be increased more than 24 per cent. without overburdening the bridge.

Limits of Bridge Car Movement.—In regard to the Bridge car capacity, the present maximum service is one four-car train despatched each way every 55 seconds. There is good reason to believe that by increasing the speed of movement during the operation of switching, these four-car trains could be safely despatched at intervals of 45 seconds. This would make possible the running of 80 trains, or 320 cars every hour, which would be the maximum capacity of the service under the tail-end switching system now used. To increase the number of cars per train would not increase the number that can be despatched per hour except by increasing the speed at which they are handled. If another car be added to the train the distance passed over in switching would be increased by twice the length of that car, and the time consumed in switching would be increased proportionately. If the average speed in switching were six miles an hour the number of cars despatched in an hour would be the same by either four-car trains or five-car trains; but with six-car trains not so many cars per hour could be despatched. A speed in motion of six miles an hour for the very short run made in the operation of switching could probably not be safely exceeded in practice, whatever the motive power or the braking power. As the present capacity of the switching tracks is ample for five-car trains, nothing would be gained by lengthening out the present tail-end tracks. In other words, beyond the possible increase of speed of switching referred to above, the maximum capacity of the tail-end switching system has been reached and cannot be increased. It is doubted if it would be possible to operate these trains with a time headway less than 45 seconds, or at a much higher speed, without grave danger of accidents. If the strength of the bridge permitted the use of longer trains, they could be readily operated when the circulating system over all the bridges, which we have recommended, shall be installed.

Future Conditions.—In addition to the travel using the bridge it must be remembered that the City Hall terminal of the Second and Third Avenue lines of the Manhattan elevated roads now handle during the rush hours, probably not less than 12,000 passengers per hour, who are received or delivered at the bridge terminal; and that when the rapid transit (underground) railroad is completed it will probably deliver and receive not less than 20,000 people per hour at its terminal station on Park Row, directly in front of the bridge terminal. We may, therefore, expect that in a very few years, unless some plan is devised for dispersing a part of the travel now using the bridge terminal, not less than 75,000 people, in one hour, must be dealt with in a space not exceeding 200 feet square.

A New Metallic Packing.

The use of higher steam pressures for locomotives has made necessary piston rods with enlarged cross-head fits and this in turn has very materially altered the requirements for piston rod packing. One of the changes brought about by enlargement of the cross-head fit is that the packing must be divided and much difficulty has arisen in designing a suitable joint between the parts. The conditions to be met by the piston rod packing are particularly severe on high-pressure locomotives having short connecting rods and on compound locomotives of the Vauclain type, in which the lateral movement of the piston rods is the greatest. One road reports that on its fast compound passenger locomotives of the Atlantic type, the metallic packing had to be renewed regularly at the end of each trip of 209 miles. This excessive wear was finally overcome by the use of a new design of packing called the Economic, which has now been put on the market by the Railway Appliances Co., Chicago, after trials extending over about two years' time. In a trial on one of the Atlantic type locomotives referred to before this packing ran over five months, making about 63,000 miles without repairs, and it was apparently in good condition at the end of that time when the engine was taken into the shops.



Application of Economic Packing to 3¼-in. Piston Rod with Enlarged Cross-head Fit.

At the present time the Chicago, Burlington & Quincy owns the shop right and has between 250 and 300 locomotives equipped with this packing, and it is now the standard for piston rods with enlarged cross-head fits. The Chicago & Western Indiana also has a number of engines equipped and Economic packing was recently removed from one of these after 23 months' continuous service. Other roads are trying the packing more or less extensively and it has also been used successfully on stationary engines.

The application of this packing to a 3¼-in. piston rod with a 4-in. cross-head fit is shown by the accompanying engravings. It will be seen that the stuffing box and the solid rings are all made to slip over the enlarged cross-head fit while the other parts, fitting the rod more closely, are parted. The packing consists of four babbitt metal segments which interlock one with another and which are set into a brass retaining ring. A flat spring is placed between the ring and the back of each segment. The combination is such that the packing can adjust itself to inequalities in the piston rod, or to lateral motion, and at the same time make a steam-tight packing. It will be seen that the steam is free to enter back of the segments and when the engine is working the steam sets the packing out. The springs are intended merely to keep the packing against the rod when there is no pressure in the cylinder. The packing can be adapted to fit the present glands of locomotives now in use.

The Brooklyn Bridge Terminal.

The report of the three engineers appointed under the McCarren law to devise some adequate plan to relieve the crush at the Manhattan terminal of the Brooklyn Bridge will be received with mixed feelings of approval and dislike. The important proposals of the engineers are (1) an elevated road along Centre street to a terminal at Worth street, this terminal to be eventually connected with the new East River and the Pike Street Bridge; (2) an elevated road along Park Row, through Vesey street to West street, and thence to Cortlandt street, with a station connecting with the Sixth and Ninth avenue "L" roads; (3) the use of the gallery floor of the present terminal exclusively for the trolley cars, with adequate entrances and exits.

These proposals are undoubtedly well calculated to relieve the present terminal of a part of its traffic, and it does so in a manner which would make the structure additionally useful to the public. The stations at Worth street, on Vesey street and at Cortlandt street would undoubtedly be used by a large fraction of the travelers that crowd the stairs at the existing terminal. The connections with Bridges Nos. 2 and 3 would also relieve the crush by giving these bridges an immediate connection with the districts which many of the passengers are seeking and leaving. The possibility of transferring to the West Side elevated roads would be an immense boon to the many travelers to whom it would be convenient to use those lines. Finally, the dedication of the gallery exclusively to the trolley cars would be a decided improvement upon the truly deplorable and dangerous present condition of the ground floor.

But it must be admitted that the city will have to pay dear for the relief which these elevated roads would afford. The core of the business district would be cut up by iron structures, which might be an improvement upon those already erected, but which at the same time could not be anything but unsightly, particularly in the immediate neighborhood of so many important public and private buildings. The engineers describe this class of objection as sentimental; but, sentimental or not, it will undoubtedly appeal strongly to the many people who believe that New York should not be disfigured by more elevated roads, particularly on and across prominent streets.

At the same time, although we admit the strength of these objections, it is difficult to see how the building of such additional elevated roads can be avoided. The present condition of the Manhattan terminal is intolerable, and the best way it can be permanently and adequately relieved is to carry part of the traffic away to other and less congested points. It should be added, however, the estimated cost of these improvements by the engineers is obviously very much too small.—*Real Estate Record and Guide.*

Train Accidents in the United States in August.*

unf, 1st, Atchison, Topeka & Santa Fe, Ludlow, Cal., freight train broke through a trestle bridge which had been weakened by a flood and two engines and six cars fell to the gully, 10 ft. below.

bc, 2nd, Chicago & Alton, Odessa, Mo., butting collision of freight trains; one engineman killed, two other trainmen injured.

xc, 2nd, Houston, Tex., passenger train of the Galveston, Houston & Henderson ran into freight of San Antonio & Aransas Pass at crossing, wrecking three freight cars; five trainmen slightly injured.

unf, 2nd, Texas Midland, Enloe, Texas, a work train running backward was derailed by running over a horse; tender, caboose and one car overturned; conductor killed, one trainman injured.

unx, 2nd, Gulf & Ship Island, Lumberton, La., freight train derailed near a trestle bridge and six loaded cars, with the bridge, were wrecked; two tramps were killed and a third was injured.

o, 2nd, Western & Atlantic, Bolton, Ga., locomotive of passenger train wrecked by explosion of its boiler; baggage car derailed; engineman and fireman injured, the latter fatally; the mail clerk was also injured.

bc, 3rd, Indiana, Illinois & Iowa, South Bend, Ind., butting collision of freight trains, wrecking both engines and many cars. A few minutes after the collision a second eastbound freight ran into the rear of the one which had been wrecked, badly damaging engine and several cars. In all, three engines and 20 cars were badly damaged.

bc, 4th, 1 a.m., New York Central & Hudson River, Gasport, N. Y., butting collision of passenger trains, one of which was running at full speed, making a bad wreck. One engineman and one brakeman were killed and many passengers were injured, though none very severely. The eastbound train had just started from the water station,

*The *Railroad Gazette* monthly train accident record is now and hereafter to appear in a form somewhat different from that heretofore used. Accidents in which injuries are few or slight and the money loss is apparently small, will usually be omitted from the list, thus making it materially shorter. The tabular statement of totals will be omitted entirely, as a more complete report of the total number of accidents occurring will probably be published by the Interstate Commerce Commission. The separation of the classes is abandoned, but the classification will be indicated at the beginning of each paragraph, by the use of the following

ABBREVIATIONS.

rc	Rear collisions.
bc	Butting collisions.
xc	Miscellaneous collisions.
dr	Derailments; defect of roadway.
eq	Derailments; defect of equipment.
dn	Derailments; negligence in operating.
unf	Derailments; unforeseen obstruction.
unx	Derailments; unexplained.
o	Miscellaneous accidents.

The third class, "xc," includes collisions (formerly classed as "rear") due to trains breaking in two and the rear portion subsequently running into the forward one.

and a brakeman, on seeing the westbound train approaching, ran forward with a lantern in the hope of stopping it, but he was unsuccessful, and the effort cost him his life, as a baggage car knocked over by the collision crushed him to death. The engineman of the westbound train mistook an eastbound special train standing on the side track at Middleport for the second section of regular eastbound passenger train No. 332, the one which he ran into. It is said that the special passenger on the side track displayed two white lights, according to the rule.

xc, 4th, Erie road, Corning, N. Y., collision of freight trains in switching; a car of naphtha was overturned and exploded; this car, with three other cars of naphtha and several buildings, including the signal cabin at the crossing of the New York Central, was destroyed by fire. The signalman jumped out of a window and was injured.

dr, 4th, Eastern Minnesota, Stonybrook, Minn., freight train consisting of 30 cars loaded with iron ore was wrecked by the failure of a bridge, and the engine and 16 cars fell to the ravine below, part of them falling into the St. Louis River. One brakeman was killed and three other employees were injured. The bridge was a three-span Howe truss built one year ago. It is believed that one of the piers had been weakened by the action of the water.

unx, 5th, Norfolk & Western, Solitude, Va., passenger train running at full speed derailed; express, baggage and mail cars wrecked.

bc, 6th, Dayton & Union, Union City, Ind., butting collision between passenger trains No. 35 and No. 18, due to a misplaced switch. Both engines were wrecked. One passenger and two trainmen were injured, the former fatally.

dn, 6th, Great Northern, Bernice, Mont., a freight train became uncontrollable on a descending grade and 22 cars were derailed and wrecked at a sharp curve. The engine and 11 cars at the front of the train, and 15 cars and the caboose at the rear, did not leave the track. One brakeman was injured.

eq, 7th, San Diego, Cuyamaca & Eastern, San Diego, Cal., mixed train derailed by breaking of a wheel; passenger car and one freight car overturned; six passengers injured.

unf, 7th, 2 a.m., Great Northern, Sultan, Wash., freight train derailed by a tree which had been burned by a forest fire and had fallen across the track; engine and several cars wrecked and five cars of lumber burned up. Engineman killed and fireman injured.

rc, 8th, Baltimore & Ohio, Confluence, Pa., passenger train, heavily loaded with excursionists, standing at the station, was run into at the rear by a following excursion train, and the engine and three cars were badly damaged. The fireman and nine passengers were injured.

rc, 8th, Baltimore & Ohio, Benwood, W. Va., freight train standing in the yard was run into at the rear by a following freight, the engineman of which, it is said, had fallen asleep; two trainmen injured.

dr, 8th, on Southern Pacific, near Sabine, Tex., a mixed train broke through a trestle bridge and the engine, seven freight cars and two passenger cars fell into Keith Lake gully. The rear passenger car was only partly submerged and the passengers were not seriously injured; but the next car in front sank so far that the eight persons in it came very near being drowned. They were rescued by men from a tug which happened to be near. There were no serious personal injuries. The bridge had been weakened by the teredo, in water believed to be fresh.

unx, 8th, Texas & Pacific, Plaquemine, La., passenger train No. 5 was derailed and a sleeping car was overturned and fell down a bank. Eight passengers and one trainman were injured.

bc, 9th, Grand Trunk, Charlotte, Mich., passenger train No. 9 westbound, ran over a misplaced switch and into the head of an eastbound freight, wrecking both engines; one trainman injured.

xc, 9th, Eureka, Texas, passenger train on Missouri, Kansas & Texas ran into a work train of the Houston & Texas Central at the crossing of the two roads. Mail car and two platform cars wrecked.

unx, 9th, Lehigh Valley, North Leroy, N. Y., eastbound express train running at full speed derailed; rear car ditched and overturned. Six passengers and two trainmen injured, none of them seriously.

unx, 9th, Cleveland, Cincinnati, Chicago & St. Louis, Louisville, Ky., a freight train with an engine at the rear as well as in front, was derailed at or near the front end; the leading engineman gave the whistle signal to stop, but this signal, it is said, was not understood and the rear engineman did not shut off steam. The leading engine was pushed off the side of an embankment.

unf, 10th, Boston & Maine, Capelton, Me., a passenger train was derailed at a washout; one passenger injured.

bc, 11th, Buffalo, Rochester & Pittsburgh, Carmen, Pa., butting collision of freight trains, wrecking both engines and a dozen cars. The B., R. & P. road, and the Pennsylvania track lying adjacent, were both blocked many hours. Six trainmen were injured, one of them fatally. It is said that an operator failed to deliver an order to train No. 42. There was a dense fog at the time of the collision.

unf, 12th, 11 p.m., International & Great Northern, Elliott, Texas, passenger train No. 1 was derailed by running over a cow, and the engine was overturned in the ditch; two trainmen injured.

o, 12th, Denver & Rio Grande, LaVeta, Colo., the locomotive of a freight train was wrecked by the explosion of its boiler; engineman killed, fireman fatally injured.

rc, 13th, New York Central & Hudson River, Terrace Station, Buffalo, N. Y., passenger train ran into rear of preceding passenger; two trainmen and six passengers injured. A fire started in the wreck, but it was soon extinguished.

bc, 13th, Minneapolis & St. Louis, Otho, Iowa, butting collision between a freight train and a gravel train, badly damaging both engines. The station agent at Otho, who, by mistake, gave to the gravel train a telegraphic order which had been superseded, became violently insane on discovering his error.

bc, 13th, Chesapeake & Ohio, Norwood, Va., butting collision of freight trains, making a bad wreck; one engineman killed, two other trainmen injured.

eq, 13th, Oregon Short Line, Lava, Idaho, a freight train was derailed by the breaking of a flange and two (new) dead engines and many cars fell down a bank and were wrecked.

unx, 13th, St. Louis Southwestern, McKinney, Ark., freight train derailed and four cars wrecked; two tramps killed.

rc, 14th, Southern Ry., Moscow, Tenn., freight train ran into the rear of a preceding freight, wrecking several cars. The wreck took fire and nine cars were burned up; fireman killed and several trainmen injured.

dn, 14th, Cincinnati, Richmond & Muncie, Fowlerton, Ind., passenger train derailed at derailing switch; one passenger and two trainmen injured.

eq, 14th, 1 a.m., Chicago, Burlington & Quincy, Galesburg, Ill., freight train derailed by failure of a heated journal; 16 cars wrecked.

o, 14th, Southern Pacific, Bloomington, Cal., the locomotive of a freight train was wrecked by the explosion of its boiler; three trainmen injured.

xc, 15th, 1 a.m., Delaware & Hudson, Albany, N. Y., a number of freight cars being switched became uncontrollable and ran into a passenger train, overturning the tender and baggage car. A fire was started in the baggage car by a lamp.

dn, 15th, Philadelphia & Reading, Tamaqua, Pa., an engine standing at a water tank was run into by two other engines, badly damaging all three; four trainmen injured.

unx, 15th, Pittsburgh & Western, Elfinwild, Pa., freight train derailed; one trainman fatally injured.

xc, 16th, Choctaw, Oklahoma & Gulf, Geary, Okla. T., a special train carrying officers of the road collided with some freight cars which had been left standing on the main track; five officers injured.

dn, 16th, Cleveland, Cincinnati, Chicago & St. Louis, Raleigh, Ind., a passenger train was derailed at a misplaced switch.

unf, 16th, 2 a.m., Santa Fe, Prescott & Phoenix, Prescott, Ariz., an empty engine was derailed by a pile of rock on the track, and fell down a bank; engineman and fireman killed. It is said that the rock had been loosened from a ledge by a stroke of lightning.

bc, 17th, 4 a.m., Union Pacific, Table Rock, Wyo., butting collision between passenger train No. 1 and two empty engines; engines and several cars badly damaged; seven passengers and three trainmen injured.

xc, 17th, 11 p.m., Brooklyn, N. Y., collision between a northbound passenger train and a southbound electric car at a junction where the passenger train had to cross the path of the electric car. The motorman of the electric car was killed and 43 of the passengers in this car were injured. Electric and steam motors use the same railroad at this place. It is said that the motorman disregarded a stop signal set against him. The state railroad commissioners, after investigating the collision, recommended that a derailing switch be put in at the point where the electric car ought to have stopped.

eq, 17th, Southern Pacific, Glendale, Ore., a freight train broke in two and the sudden stoppage of the cars by the automatic application of the air-brakes caused an exploison of dynamite in the rear car, and 11 cars were destroyed. A car containing acid took fire and several cars and some surrounding property were burned up. Buildings half a mile distant were shattered. Two trainmen were injured.

eq, 17th, Central of New Jersey, Laurel Run, Pa., a freight train broke in two between the tender and the first car, and the resulting automatic application of the air-brakes derailed and wrecked 25 cars. It is said that the break-in-two was due to improper application of the brakes on a steep descending grade.

un., 18th, 2 a.m., Chesapeake & Ohio, Hurricane, W. Va., a freight train drawn by two engines was derailed at a misplaced switch and both engines and many cars fell down a bank; five trainmen injured.

rc, 19th, Pennsylvania road, Prospect, N. Y., a passenger train standing at the station was run into at the rear by an empty engine; five passengers injured.

unf, 19th, Pittsburgh & Western, Moravia, Pa., a freight train broke through a bridge over a highway which had been undermined by a flood and the engine and several cars fell into the opening. The fireman was killed and two other trainmen were injured. A stream near the highway had suddenly risen, in consequence of a violent rain, and had overflowed the road. The natural crossing for the stream is about 300 ft. east of the highway bridge.

xc, 21st, 1 a.m., Chicago & Alton, Prentice, Ill., collision between southbound passenger and northbound freight, wrecking both engines, one passenger car and one freight car. The freight train had taken a side track to wait for the passenger. It is said that the train, after being stopped, had moved forward a short distance without the knowledge of the trainmen, and fouled the main track immediately in front of the passenger train. The engineman and fireman of the passenger train and two tramps were killed, and 10 passengers were slightly injured. A newspaper account says: "It is pretty well settled that the engineer and fireman of the freight with which the Hummer collided at Prentice Wednesday morning had been asleep. The freight had been on the siding for several hours waiting for preferred trains to pass. Three trains had passed it. How it came to slide onto the main track is one of the mysteries which probably can never be solved, for the brakes were all set and the engine had been left on dead center. It was going east and had stopped at Prentice to let the fast stock pass, and also the two west-bound passengers. The crew planned to lay on the side track several hours and as they were all worn out by the hard day's work, all, it is said, went to sleep. The conductor, after entering the siding cut the crossing of the main street of the town. This crossing is located about 20 car lengths from the east switch and left the engine near to the main track. What happened after the crew went to sleep is not known. There are two theories. One has it that the jar of the two trains passing started the engine and cars to rolling a few feet, perhaps 30 or 40, out onto the main track. The side track at the east end is lower than at the west and the force of gravity would roll the cars along in that direction. The freight engine must have extended just over the frog. It is thought that the cylinders and edges of the boilers met, throwing both engines to one side and overturning them."

dr, 21st, Pittsburgh, Johnstown, Ebensburg & Eastern, Juniata, Pa., passenger train derailed by broken rail and engine, one freight car and two summer passenger cars fell down a bank, the cars being overturned. The seven occupants of the cars escaped with slight injuries.

rc, 21st, Pennsylvania road, Durward's, Pa., freight train unexpectedly stopped was run into at the rear by a following freight; eight cars wrecked; engineman killed, fireman injured. It is said that the flagman of the standing train had just started back when the collision occurred.

xc, 21st, Baltimore & Ohio, Chicago Junction, Ohio, freight train drawn by two engines collided with freight cars on a side track, wrecking both engines and 25 cars; one engineman killed, two other trainmen injured.

bc, 22nd, 5 a.m., Pere Marquette R. R., Thread Creek, Mich., butting collision between passenger trains No. 1 and No. 10, damaging both engines. The engineman of No. 10 misread a telegraphic order; he read Flint instead of Thread Creek.

xc, 22nd, 1 a.m., Hoxie, Ark., freight train on Kansas City, Fort Scott & Memphis collided with freight on St. Louis, Iron Mountain & Southern at the crossing of the two roads, wrecking seven cars and damaging the station building.

xc, 22nd, Chicago & North Western, Fond du Lac, Wis., passenger train No. 275, collided with a freight, injuring five passengers.

unx, 22nd, Georgia, Southern & Florida, White Springs, Fla., passenger train derailed; several passengers injured.

eq, 23rd, Pittsburgh, Cincinnati, Chicago & St. Louis, Collinsville, Ohio, freight train derailed by the catching of a loose brake rod in a cattle guard; 14 cars thrown down a bank and wrecked.

unf, 23rd, Lehigh Valley, King's Ferry, N. Y., passenger train derailed by a landslide and the engine fell into Cayuga Lake; fireman killed and enginemen injured.

unf, 23rd, Chicago, Milwaukee & St. Paul, Champion, Mich., passenger train derailed by running over a cow and engine overturned; engineman and fireman injured, the former fatally.

eq, 24th, 10 p.m., Erie road, Geneva, Pa., freight train derailed by broken journal; 20 cars wrecked; two tramps injured.

eq, 24th, Chicago & Alton, Pontiac, Ill., freight train derailed by defective truck; several cars wrecked. Several loaded oil tank cars were broken and emptied.

dn, 24th, Chicago & North Western, Janesville, Wis., locomotive and one freight car left unattended on a grade while the engineman and fireman went to the station agent's office, started down the grade and were derailed close to a large new factory. The wall of this building was crushed sufficiently to knock out the support of a water tank on the roof, and the tank, with its contents, in falling, damaged the buildings many thousand dollars' worth.

unf, 24th, Seaboard Air Line, Patrick, S. C., passenger train derailed by washout; engine and four cars overturned; fireman killed, three other trainmen injured.

rc, 25th, Northern Pacific, Valley City, N. Dak., a heavy freight train approaching the station on a steep descending grade ran into the rear of a preceding freight, wrecking the caboose and two cars. A tramp stealing a ride was killed. It is said that the engineman of the approaching train was misled by the lights of the city.

bc, 25th, Illinois Central, Paducah, Ky., butting collision between a passenger train and an empty engine, wrecking both engines and the baggage car; one engineman killed. The runner of the empty engine forgot about the passenger train.

bc, 25th, Pere Marquette, near Bellaire, Mich., butting collision between a work train and a freight, wrecking both engines; one fireman injured.

eq, 25th, New York Central & Hudson River, Cato, Pa., freight train derailed by broken wheel; 15 cars fell down a bank and were wrecked.

unf, 25th, 11 p.m., Atchison, Topeka & Santa Fe, Clements, Kan., a freight train was derailed by a broken journal and several cars were wrecked. A brakeman was killed.

rc, 26th, 3 a.m., Southern Pacific, Ryan, Texas, passenger train No. 10 ran into the rear of a preceding freight train, wrecking engine and two cars. A drover was fatally injured and two trainmen were hurt.

xc, 26th, 11 p.m., Pittsburgh, Fort Wayne & Chicago, Haysville, Pa., freight train ran into the side of another freight moving in the same direction on an adjoining track, apparently in consequence of a misplaced switch, and many cars were wrecked; one brakeman killed, two other trainmen injured.

unf, 26th, Baltimore & Ohio, Barnesville, Ohio, a special passenger train was derailed by running over a horse, and the entire train was ditched; engineman killed, fireman fatally injured.

unf, 27th, Atlanta, Knoxville & Northern, Ellijay, Ga., freight train broke through a trestle which was undergoing repairs and is said to have been weakened by a flood, and the engineman was killed. Two trainmen were injured.

unf, 27th, Southern Ry., Danville, Va., passenger train derailed at a washout; 10 passengers injured.

rc, 28th, Buffalo, Rochester & Pittsburgh, Orchard Park, N. Y., freight train drawn by two engines ran into a preceding empty engine and two engines were derailed, one of them being overturned; two trainmen injured.

unx, 28th, Lehigh Valley, Glen Onoko, Pa., an engine drawing one car of workmen was derailed while running at full speed on a descending grade and fell down a bank; engineman and fireman killed.

rc, 29th, Pennsylvania road, Penbryn, Pa., freight train descending a grade was delayed by breaking in two; and was immediately run into at the rear by a following freight, and the caboose and three cars were wrecked. The engine was badly damaged; engineman killed.

unx, 29th, Pennsylvania road, Derry, Pa., freight train derailed, nine loaded cars wrecked and destroyed by fire; fireman fatally injured.

unx, 29th, Pennsylvania road, Fairville, N. Y., passenger train derailed; engine overturned, two passenger cars crushed. Steam from the engine filled the wrecked cars and all of the passengers were scalded. Sixteen passengers were killed or died soon after and 11 passengers were injured.

unx, 29th, Denver & Rio Grande, Chama, N. Mex., passenger train derailed and one sleeping car overturned; one passenger killed, three passengers and one trainman injured.

xc, 30th, 9 p.m., Great Northern, Nyack, Mont., westbound passenger train No. 3 was run into at the rear by a train of 28 loaded freight cars which had escaped control on the steep grade at Essex, 16 miles east of Nyack, and two passenger cars, an official car and 10 cars of shingles were completely wrecked. The wreck took fire at once and was mostly destroyed. Thirty-four persons were killed by the collision or were burned to death, and 10 others were injured, three of them fatally. The rear car of the passenger train was filled with men going to work on the construction of a new railroad and all of the persons killed were in this car except three. These three were the Superintendent of the road, Mr. P. L. Downs, his son and his servant, who were in the official car next ahead of the car containing the laborers. The body of young Downs, and the bodies of most of the laborers killed, were burned to ashes. A coroner's jury which investigated the wreck found that the freight cars had been left standing on a side track and that the rear brakeman had been seen by several witnesses to set the brakes on some of the rear cars; and the jury reported that the train escaped through some unknown cause, the trainmen being blameless. It appears that the engine had been detached to take water, and that the trainmen were with the engine or had gone to get supper.

rc, 30th, Baltimore & Ohio, Hickman Run, Pa., collision of freight trains; one engineman killed, one injured.

Sept. 20, 1,300 employees of the Milan Northern Railroad, which has a small system of short lines in the rich country north of Milan, suddenly struck, and out of 72 trains on the time-table only three or four could be despatched. Local newspapers say that the strikers were demanding an advance in the minimum monthly wage from $9 to $15—the extortioners!

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
PUBLISHED EVERY FRIDAY
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

A readjustment plan for the Mexican National is being advertised and a synopsis of it appears in our news columns. This is an enterprise of peculiar interest, for it involves the change of gage of the Mexican National so as to give a standard (4 ft. 8½ in.) gage line for that road from the City of Mexico to Laredo. The conclusion has been reached after careful study that this change is necessary for the future prosperity of the road. It is estimated that the change of gage and other necessary improvements, including the building of the El Salto extension, will cost about $10,200,000, and that after these improvements are made the net earnings will amount to about $2,100,000 and will then gradually increase. When this change is carried out and the El Salto extension built the mileage will consist of about 953 miles of standard gage track and 452 miles of narrow gage. The plan provides for the creation of the following new securities, namely, $20,000,000 prior lien 4½ per cent. bonds with the right to increase this issue by an amount not to exceed $3,000,000; $15,000,000 first consolidated 4 per cent. bonds, with the right to increase this issue by an amount not to exceed $15,000,000, and to issue not to exceed $23,000,000 more of these bonds, to retire an equal amount of the 4½ per cent. prior lien bonds; $25,000,000 4 per cent. non-cumulative preferred stock, and finally $33,350,000 common stock, this latter to be exchanged dollar for dollar for the existing capital stock. Out of these new securities the syndicate is to purchase $9,221,000 of the prior lien bonds, $3,595,000 of the first mortgage bonds and $1,000,000 of the preferred stock.

A contemporary has spoken of "the astonishing fact" brought out in the report of Messrs. Duryea and Mayer on the Brooklyn Bridge "that they found the saddles on top of the towers to be fixed and immovable—that this great structure should have been suffered to reach such a predicament seems well-nigh incredible. The designer of this bridge never intended that these saddles should act as grips." Messrs. Duryea and Mayer say that "an efficient supervision of the bridge would have used all means necessary to keep" the saddles movable. Later, however, they say that while this would diminish the stresses in the masonry it would "increase the stresses in the cables from bending, already too high," and on the whole we judge that they think that the fixing of the saddles is rather more advantageous than otherwise In view of these statements it may be as well to go back and see just what the designer of the bridge did intend. On page 5 of the report of the Chief Engineer of the New York and Brooklyn Bridge, dated Jan. 1, 1877, are these words, written by Col. Roebling: "It is not expected that these saddles will move under any passing load after the Bridge is completed. The varying strains will be amply resisted by the mass of the tower; but during the construction of the Bridge, the saddles are sure to move."

It has lately been stated by Railroad Commissioner Rice, of Missouri, that on the Wabash road there has not been an accident which resulted from mistakes in telegraphic orders since the company began, five or six years ago, to instruct and catechise its men in the "schools" which are now a regular feature of the train service of that road. Every trainman is examined two or three times a year, says Mr. Rice, and brakemen understand train orders as well as do the despatchers. Six years is a long time, in which many thousand train orders would be issued. To accept this statement precisely as it stands we should want to be assured that it was based on a careful examination of the records, for mistakes in reading or executing orders are made now and then by intelligent, well-trained men. It would be very remarkable if the Wabash escaped having its share of men who are efficient and, indeed, of the highest class, as far as classification can measure a man, but who nevertheless make a mistake once in a while. Still, we have no doubt that there is much truth in Mr. Rice's statement, and one can readily believe that the exceptions to it are few and small. A trainmaster who has an educational conference with his men two or three times a year ought to be able to train the intelligent ones to a high degree of proficiency and to weed out the unintelligent. He ought to be able to perfect his rules so that none of these men could misunderstand them if they tried—so that there should be uniformity of interpretation—and do away with guesswork, disguised as "using your own judgment." We understand that the "schools" on the Wabash are held every month so that any man whom the trainmaster thinks at all doubtful, or any one who wishes to perfect himself for a higher place, can receive instruction oftener than three times a year. If the Wabash has had no collisions for five or six years there must be many superintendents who will be glad to know the fact and to copy Wabash methods of discipline. If the road has *not* made a perfect record—if Mr. Rice's language is too strong—it remains true that the superintendent has adopted one of the best instrumentalities known for securing perfection in the future. In either case, the "school" is well worth the investigation of every superintendent who has not already provided such an institution.

The Manhattan Terminal of the Brooklyn Bridge.

On another page appears an abstract of the report of the Board appointed to consider the improvement of the Manhattan terminal of the New York and Brooklyn Bridge. To those who read this report it will become apparent that three principal things are aimed at.

(1) To keep the crowds away from the bridge, so far as may be done. Incidentally to this, to provide stations nearer to the points from which the people start and to which they go.

(2) To put the bridge into such connection with other bridges to be built that trains may move continuously around the circuit in both directions.

(3) To directly improve the trolley terminal. The first two improvements will do this indirectly by making travel in the bridge cars more convenient and thus drawing away from the trolley cars.

(1) From the beginning it appeared to the Board that the true principle of treatment of this matter is to keep the crowds away from the bridge entrance and platforms. It appeared that the bridge station should be treated as a way station and not as a terminal, and that it should be the endeavor to pass through this station, already loaded in cars, a considerable percentage of the people who now appear on the platforms. A summer of observation, meditation and discussion only confirmed this opinion and now it is so obvious that it seems hardly worth stating. When it is stated, anybody will grasp it and most people will accept it. It appears as certain as any earthly thing can be that this principle will sooner or later be applied to the bridge traffic. It may be delayed but it must inevitably prevail, for nothing less can be more than a costly and temporary alleviation. It is gratifying to the members of the Board to find that the bulk of competent engineering opinion agrees in this and to find also that an observer so experienced and judicious as Mr. Abram S. Hewitt has expressed himself to the effect that the Board has hit upon the best solution possible. We quote elsewhere a short article from the latest issue of the *Real Estate Record and Guide*, an excellent journal published in New York City, which naturally stands for an important body of public opinion. That journal points out the objection to building more elevated railroads in New York City, but concludes that after all the plan as presented by the Board is probably the only one available.

The magnitude of the business done at the bridge terminal is not understood by any one who has not made a study of it. Probably it is the most congested spot on the face of the earth, and it is sure to be more so as time goes on. The bridge traffic both ways amounts to something like 100 million persons a year. So far as we know, the terminal passenger business next in magnitude is that of the Liverpool Street Station of the Great Eastern Railway in London, where something like 45 million people are handled in and out every year. At the Grand Central Station in New York the passengers in and out are only about one-seventh the number of those going through the Brooklyn Bridge Station. But this expresses very inadequately the intensity of the business, for one-half of this business must be done in four hours of the day. Indeed, it is a reasonable estimate that within a short time 75,000 people will have to be disposed of in one hour on one acre of land about the entrance of the bridge, for here is concentrated the traffic of two elevated railroads, of a number of important surface lines, of the underground rapid transit railroad and of the bridge itself. It seems unnecessary, then, to dwell upon the importance of dispersing this traffic rather than adding to it.

(2) The plan for putting the bridge into connection with the two bridges now building in such way that trains may circle over these bridges in both directions is intended to secure the greatest utility of the three bridges. We need not take the space here to repeat what is said on this matter in the report itself. A little inspection of the sketch map will show the geographical relation of the three bridges to various districts in Brooklyn and suggests at once that these bridges when in operation will divide the traffic. Under the plan proposed by the Board a passenger at the Worth Street Station, for example, can go north or south, according to his destination in Brooklyn, and this principle is capable of considerable extension. The circulating loop will also pick up and deliver passengers at convenient stations on the Manhattan Railway and on the underground rapid transit.

The obvious objection to the Board's plan of treating the bridge car situation (the term "bridge car" is used specifically as distinguished from "trolley cars") is the old one that New York City wants no more elevated railroads. We are not prepared even to admit this. We are not ready to admit that wisely planned elevated railroads built and operated up to the present state of the art would be seriously objectionable. Such roads have been recently built in some pretty highly civilized cities, and even in the city of New York the Rapid Transit Commissioners are building elevated roads on part of their line. It is a reasonable assumption that an elevated road up Centre street would increase the rental and assessable value of the property along that street something in the same proportion in which the elevated railroad has increased values on Sixth avenue, although perhaps not to so great a degree, for perhaps Centre street could never become a popular retail shopping street.

Whatever the objections to elevated railroads, it is quite obvious that the suggestion to bring the cars off the Brooklyn Bridge by means of a tunnel are impracticable. The rapid transit underground road runs directly across the entrance to the bridge, and we need not discuss the possibility of dropping the bridge cars under the grade of the rapid transit tunnel.

The plans for disposing of the bridge car matter by local loops kept east of Park Row will not bear much scrutiny. Such an arrangement would not disperse the travel from this congested area, nor would it bring the stations nearer to the destinations of the passengers. Furthermore, it would cost probably four times as much as the elevated railroad plan proposed.

(3) The relief of the trolley car situation was considerably the most difficult part of the subject. It was obvious that stairs would be objectionable. It was obvious also that the greatest flexibility would be secured if passengers could go freely across the loops at grade, and thus if they did not find the car that they wanted they could pass on and take the next best car, and thus get away from the platforms promptly. That is the present practice, and presumably that does something to keep the crowds from accumulating. Furthermore, that method of working helps to diminish the movement of partly loaded trolley cars, which in itself is important if the bridge is to render its maximum service.

After long and careful deliberation, however, it was decided that the passengers must not be allowed to cross the trolley loops at grade; that outgoing and incoming passengers must be separated, and that a way must be left for the passengers taking the promenade to go to and fro without crossing tracks at grade; and so the Board settled finally to the plan presented, feeling that some advantages were sacrificed, but that the weight of argument was in favor of this plan. It will be observed that the arrangements for handling the trolley passengers are commodious. The platform space is large and the stairways seem ample. The obvious point of making it possible for a passenger to take the next best car in case he cannot get the one that will serve him best may be met by grouping the cars that run around any given loop—that is, three or four lines serving approximately the same quarters of the city would naturally be run on one loop. Probably in the end it would be found that little of the flexibility of the present system would be lost under the system proposed, while the serious crowding and confusion now existing would be almost entirely done away with.

Annual Reports.

Chicago, Burlington & Quincy.—The report of this company for the year ending June 30 has no reference to the one fact of greatest importance in the history of the year, the change of stock control, which has placed it in the joint ownership of the Northern Pacific and the Great Northern. The controlled road is of greater extent, in mileage, in aggregate earnings, and in revenues per mile than either of the companies controlling it.

A year ago the Burlington was regarded as one of the few large railroads in this country which had no need of banking assistance, and it was entirely independent of banking opinion. Financial operations, if conducted, were without the intermediary of bankers, such operations, for instance, as bond refunding and sale of new capital being carried out by direct negotiations with shareholders, and it is a long time since Burlington has paid commissions to bankers. Its management held aloof from alliances with such interests, or even with other railroads, and the independent spirit of its management was understood to be shared by its stockholders. In fact, more than one attempt of New York banking interests to get representation on the Board of Directors by heavy purchases of stock has failed.

Yet President Hill, of the Great Northern, secured the approval of the Burlington directors, as well as those of his own company and the Northern Pacific, to an offer of $200 a share for Burlington stock, which a year ago was selling at $127 a share.

Burlington has now outstanding about 1,106,000 shares of stock and as the Northern Pacific and Great Northern have issued joint collateral 4 per cent. bonds, in exchange for this stock, on a basis of two in bonds for one in stock, they have assumed a liability for over $221,000,000 in bonds, with an annual interest charge of approximately $8,890,000, when all the Burlington stock has been exchanged. The guaranteeing companies expect to recoup their treasuries for this interest, by receipt of 8 per cent. dividends on Burlington's shares, and to effect this the Burlington dividend has been increased from 6 per cent., which had been paid for two years, to 8 per cent. within the year.

The report now at hand shows, however, that the full dividend liability at this rate was not earned by about three-quarters of a million dollars. Net income in 1901, as reported by the Burlington in the present report was $8,125,400. This apparent deficit of about $765,000 in net income to meet the interest charges assumed is subject to certain possible offsets. That is to say, Burlington's net income last year was drawn upon to the extent of $1,223,879 for sinking funds, an amount in excess of that payable in sinking fund charges by any other railroad in this country. Of this amount $428,600 was a direct cash contribution out of the year's income and $735,280 was interest on bonds bought for the sinking fund in previous years, but held uncancelled and drawing interest. The company's report states that approximately $21,600,000 represents total payments and accretions of sinking funds, and of this $13,940,000 is held by sinking fund trustees in uncancelled bonds, or cash in sinking funds. The total bonded debt is $147,204,300, as compared with present outstanding stock of $110,577,700.

The Great Northern and Northern Pacific directors, not having the interest felt by public stockholders in increasing the stock equity in the property by reducing the bonded debt, propose to abolish these sinking funds, thus saving practically a 1¼ per cent. charge against the stock. In addition, they will be able to reduce interest through refunding operations, the Burlington having over $23,000,000 of 7 per cent. bonds maturing in 1903, which can probably be replaced with a 3½ per cent. issue. Other high rate bonds mature in later years.

On the other hand is the fact, which must be considered, that Burlington's traffic and revenues for the year were based on favorable conditions. Burlington is still greatly dependent on harvest yields, and especially on the corn crop. It has over 1,000 miles in Nebraska, which usually raises more surplus corn than any other State, and about 3,600 miles out of 7,900 miles operated are in that State and in Iowa, which, together, produced over 28 per cent. of last year's corn yield. In addition it has a considerable mileage in Illinois and Missouri, also heavy producers of surplus corn. All these States have been exceptionally prosperous for some years past, and Burlington has prospered accordingly.

Iowa and Nebraska last year, according to Government statistics, harvested 516,200,000 bushels of corn, as against 466,600,000 bushels in 1899, and 414,800,000 bushels in 1898, and 461,400,000 bushels in 1897. Illinois and Missouri did relatively as well. Increase in corn harvest in these two States last year was 35,000,000 bushels, or 9 per cent., over 1899, 25 per cent. over 1898, and 10 per cent. over 1897. This year, however, the corn yield in all these States is very short.

What Burlington's earnings may be, in this fiscal year or next, as effected by the corn harvest, need not be discussed now, but the record of growth in earnings in recent years is noteworthy, as appears from the figures for a series of years below:

	Average miles.	Gross earnings.	Net earnings.	Gross per mile.
1901	7,753	$50,051,990	$15,983,080	$6,405
1900	7,546	47,535,000	16,113,100	6,251
1899	7,250	43,389,000	15,253,000	5,942
1898	7,180	42,800,200	14,989,300	5,961
1896	7,180	34,176,000	13,040,000	4,760
1895	5,371	24,874,200	9,441,000	4,341
1894	5,626	24,667,100	9,666,000	4,381

Last year Burlington's increase of $2,516,569 in gross earnings was more than absorbed in increased expenses, while in 1900, with an enhancement of $4,146,000 in gross earnings, net increased only $859,119. What accounts have chiefly absorbed the gain in receipts appears below:

	1901.	1900.	1899.
Maintenance of way	$8,676,028	$8,109,583	$6,323,774
Maintenance of equipm't.	6,094,872	5,499,356	4,783,194
Conducting trans	16,179,511	14,992,149	14,026,096
General expenses	1,491,478	1,215,749	1,412,566
Total	$32,441,890	$29,816,838	$26,545,630
Taxes	1,627,017	1,605,503	1,589,835
All expenses	$34,068,907	$31,422,342	$28,135,465

In 1901, the increase in transportation cost was $1,187,000, as against $966,000 in 1900. Higher prices of material, principally coal, and higher wages rate had most to do with this expansion. Last year the increase in ton-miles was 77½ millions, against an increase of 419½ million ton-miles in the previous year, and there was an actual decrease of freight train mileage in 1901, while increase in passenger train mileage was at the same figure as in 1900. Over half of the higher cost of moving traffic last year, or $556,000, was in cost of locomotive fuel alone.

Besides the improvement work charged into Burlington's maintenance accounts, and the increase of 3½ million dollars in these accounts in the last two years, the company has provided funds for such work in new capital, by issue of new stock at par to shareholders. In 1901, for instance, improvements and new equipment capitalized were $8,134,000 on all lines, of which $1,525,162 was for new equipment. The heaviest item was $2,508,600 for reduction of grades in Iowa and new second track; this amount being larger even than cost of new lines, $2,391,300.

Changes in capital account in 1901 included an increase in outstanding shares by $2,297,000 through exchange of convertible bonds and $9,834,600 sold at par to shareholders for improvements, refunding, etc.

Reading Company.—The essential features of this company's operations in the past fiscal year were that, with gross receipts running up to $62,143,000, working charges of the railroad and coal companies and of the proprietary Reading Company absorbed 75 per cent. of this sum; fixed charges and taxes took another 20 per cent. of receipts, so that the net earnings in the year were $2,663,100. Out of this was paid the general mortgage sinking fund of 5 cents per ton of coal mined from the Reading Coal & Iron Company's mines, amounting to $336,371, a charge which is obligatory before dividends can be paid. Two dividends were also paid on the first preferred stock ($28,000,000), one in September last amounting to 1½ per cent., and the second, in March last, at an increased rate of 2 per cent.

As regards comparisons of revenues with the previous year, which was an exceptionally prosperous one for the three Reading companies, it is noteworthy that, despite the coal miners' strike of last fall, which shut down all the collieries in the anthracite region of Pennsylvania for six weeks, gross earnings of the two operating companies—that is, the railroad company and the Coal & Iron company—increased materially, $1,442,000 in the case of the former and $1,033,000 in the case of the latter. In each case, operating expenses absorbed much the largest share of this enhancement of revenue, so that the gain in net earnings in the case of the railroad company was $233,000 and $328,000 for the coal company. The Reading Company, which owns all the outstanding stock of the two operating companies, and receives most of its income in the form of interest on bonds of those companies which it holds and rental for the railroad equipment, the title of which is in the Reading Company, increased its gross income by $545,000, the gain for the three companies thus running up to $3,019,000. Net earnings increased $1,066,298 over 1900.

The advance sheets of the report now at hand do not contain comparative statements of income, but the essential changes will be found compiled in the following tables, which show, first, combined earnings of the three companies, including, necessarily, certain duplications of items; second, the income account of the Reading Company, whose income is mainly received from the railroad and the Coal & Iron company, and, thirdly, the separate statements of the latter properties.

Earnings and expenses of all Reading companies:

	1901.	1900.	1899.
Gross earnings	$62,143,471	$59,124,126	$46,882,908
Operating expenses	46,621,008	44,857,391	36,643,847
Net earnings	$15,522,463	$14,266,735	$10,239,061
Fixed chgs. and taxes	12,859,376	12,328,734	9,073,852
Surplus	$2,663,087	$1,938,001	$1,165,209

Income of the Reading Company proper:

	1901.	1900.	1899.
Income	$4,881,443	$4,336,494	$3,358,543
Expenses	61,507	36,380	21,579
Net earnings	$4,819,936	$4,300,114	$3,336,964
Charges and taxes	3,278,865	2,964,638	2,819,537
Balance	$1,541,071	$1,335,476	$517,427
Sinking fund	366,371	383,525	.....
Balance	$1,174,700	$951,951	$517,427
Dividends	934,735	374,735	.....
Surplus	$239,965	$577,216	$517,427

Earnings and expenses of the two operating companies:

Railroad company—

	1901.	1900.	1899.
Operating receipts	$27,617,422	$26,109,734	$22,456,193
Other income	726,748	793,254	546,395
Total receipts	$28,344,170	$26,902,987	$23,002,588
Operating expenses	15,742,920	14,534,065	12,281,898
Net earnings	$12,601,250	$12,368,922	$10,720,690
Insurance fund	233,935	222,279	95,026
Equipment renewals	650,508	593,288	665,870
Improvements	1,938,989	1,903,797	837,370
Net income	$9,777,818	$9 649,558	$9,122,424
Charges and taxes	9,211,197	8,904,249	8,897,679
Surplus	$566,621	$745,309	$224,745
Account fund	.....	.....	224,745

Coal & Iron Company—

	1901.	1900.	1899.
Receipts	$28,917,858	$27,884,644	$23,643,838
Expenses	25,887,283	25,182,078	22,364,177
Net earnings	$3,030,575	$2,702,566	$1,279,661
New wk. at collieries	806,308	750,499	377,926
Int. to Reading Co	886,505	884,850	.....
Land depletion fund	413,053	*750,104	.....
Net income	$924,709	$317,113	$901,735
Charges and taxes	369,315	459,848	478,697
Surplus	$555,395	*$142,735	$423,038
Surplus 3 comp's	$1,361,981	$1,179,791	$940,475

*Deficit.

Statistics of the traffic movement for 1901 are not at hand, but from such facts as are contained in the President's summary, it would appear that higher rates account for a good deal of the increase in the revenues of the railroad company, and that higher prices likewise explain largely the gains in the coal company's revenue. With an increase of 2.8 per cent. in tons of coal moved, revenue from coal freights increased by $1,020,105, or 8.97 per cent.; merchandise tonnage increased by 2.42 per cent. and revenues by 3.27 per cent., while the increase of 3.59 per cent. in passengers moved brought about a gain of $123,543, or 2.79 per cent., in passenger revenues.

In each of these several classes of business the railroad company's revenues ran considerably beyond those reported in any previous year. The following figures will show the development since 1898, when the present company took over the Reading property:

	1901.	1900.	1899.	1898.
Coal traffic	$12,391,307	$11,371,203	$10,085,701	$9,931,896
Merchandise	10,079,427	9,750,602	7,824,888	7,163,170
Passenger	4,561,393	4,437,850	4,012,729	3,877,547
Total oper-at'g rev.	$27,617,422	$26,109,734	$22,456,193	$21,475,242
Other rec'pts	726,748	793,254	546,395	511,592
Total earn.	$28,344,170	$26,902,987	$23,002,588	$21,986,834

Other receipts in this table are the net returns from the operation of the company's ocean tugs, etc.

Besides what may be regarded as the ordinary expenses of working, the figures of the income account, as given above, show that a very large proportion of the Reading's revenues are absorbed in special charges. The items of insurance fund and equipment renewal expenses, $884,000 together, may be regarded as perhaps properly to be included in operating expenses. Outside of these charges, however, it will be seen that the railroad's income was charged with $1,939,000 last year for improvements, and the details given of these show that the cost of the work might legitimately have been charged to construction or capital account, as they form no part of proper maintenance or renewal work. The main items of these expenditures were as follows:

Real estate	$126,105
Extension of main, second and third tracks	231,254
Passing and lay-off sidings; cross-over tracks	167,419
Yard tracks; depot tracks; coal yard tracks; manufactory tracks	248,790
Steel and iron bridges, stone bridges and culverts	85,638
Interlocking plants and signals	257,558
Passenger stations and shelters; freight stations; water and fuel stations	343,900
Shop and engine houses; turn-tables	78,956
Docks and wharves	376,613
Sundries	22,752
	$1,938,989

Additional trackage built was 53 miles, of which 39 miles was sidings.

The above expenditures include nothing for new equipment, but large additions have been made on this account, and valuation of equipment is now placed as $8,297,300. Of this sum $5,431,300 has been provided by creation of car trusts, $2,359,860 by sale of Reading Company securities and the remaining sums on various accounts.

The report adds that "arrangements for necessary additional equipment have already been made. All of these

expenditures for additional equipment, by the issue of car trusts, will ultimately be provided for by the issue of general mortgage bonds reserved for that purpose."

The year was made notable by the purchase, at $160 per share, of a majority of the capital stock of the Central Railroad of New Jersey, which on several previous occasions has been under lease by the Reading. Of the value of this the President says: "The acquisition of the control of the Jersey Central is not only of enormous advantage, because of the additional facilities given to the system, but through this acquisition the Reading system now owns and controls about 63 per cent. of all the unmined anthracite coal in the State of Pennsylvania.

The Reading now owns 145,000 shares out of a total of 272,138 shares of Jersey Central stock, costing $23,200,000. This sum was paid by the sale of 60,353 first preferred shares and 34,275 second preferred shares, and the issue of $23,000,000 four per cent. collateral trust bonds due in 1951, which were secured by the deposit of the 145,000 shares of the capital stock of the Central Railroad of New Jersey, 29,900 shares of the capital stock of the Perkiomen Railroad, and 4,400 shares of the capital stock of the Port Reading Railroad Company.

August Accidents.

The principal railroad accidents which occurred in the United States in the month of August are recorded in another column of this issue. The list contains 34 collisions, 44 derailments and 3 locomotive boiler explosions. Picking out those accidents in the list which may be called most prominent we find 13, as follows:

4th—Gasport, N. Y.
4th—Stony Brook, Minn.
6th—Bernice, Mont.
8th—Sabine, Tex.
8th—Confluence, Pa.
9th—Leroy, N. Y.
11th—Carmen, Pa.
17th—Glendale, Ore.
21st—Prentice, Ill.
24th—Janesville, Wis.
25th—Valley City, N. Dak.
29th—Fairville, N. Y.
30th—Nyack, Mont.

The accidents fatal to passengers were those at Nyack and Fairville. These two, with the collision at Gasport, were the three worst passenger train accidents. The very serious disaster at Nyack is of the same kind as a number of disastrous wrecks which have occurred in the Northwest within a few years, but which have heretofore received but little notice because no passenger train has been wrecked and the number of fatalities in each case was not large. A second accident of this kind appears in this same record, that at Bernice, Mont., and two worse than Bernice will appear in the September record. It would seem as though the cost of a few such wrecks must be greater than the cost of maintaining block signal stations and "catch sidings" at intervals along these very steep grades. It may be that in order to save the runaway freight trains it would be necessary to have the safety switches very near together, for sometimes such trains jump the track before they have traveled far; and the upgrade track for slackening the speed of runaways might have to be of considerable length; but it would be possible to at least protect the passenger trains with a very few safety-point stations connected to one another by telephone or telegraph. If the newspapers of the Northwest exploit these disasters as thoroughly as those in Eastern cities do such work, the maintenance of safety switches would be a profitable advertisement for a line carrying many passengers, howsoever good the discipline of its trainmen or the maintenance of its cars and engines.

An officer of the road informs us that the investigation which was made after this collision to discover how the freight cars came to get away, produced no satisfactory result; so that the best account we have of the cause is that given before the Coroner by Conductor Matthews of the freight; his testimony was to the effect that he had charge of No. 10 when it pulled into Essex station and that he threw the switch while the rear brakeman, Gates, cut off the helper engine, which went on up the main track, [after] the freight train [had] pulled in on the side track. He said he saw the rear brakeman, after he uncoupled the helper engine, climb to the top of the rear freight car and set the brake, and that he also saw him on the sixth car from the rear setting the hand brakes. He says that every precaution was taken to make the train secure and that it was not possible for the freight as it was left standing to run away unless the brakes had been tampered with. Rear Brakeman Gates testified as to setting the brakes and that the train was standing still when he set the last three or four brakes.

The remedy for cases like that at Gasport is, of course, the block system. The Fairville derailment must be classed as unexplained, though the coroner reported that "a possible cause for the wreck may be found in a flattened track bolt, found Sept. 12, near the first mark of derailment, and also in marks of this bolt, found in the top surface of west rail of track 7 ft. 5 in. north of the first mark of derailment, on west side of west rail. That any person placed this bolt, or saw this bolt upon the track prior to the wreck, or how this bolt came upon the track, was not shown by the testimony of any witnesses."

The wreck of the passenger train at Sabine, Texas, has already been mentioned in the *Railroad Gazette*. The derailment at Leroy is notable for the small number of personal injuries resulting from the derailment of a very fast train.

The damage resulting from the other accidents listed above was mostly connected with freight trains. The accident at Glendale, Or., calls attention to the desirability of carrying explosives in trains which not only have the air-brakes connected throughout their whole length, but which also are short enough so that the slack cannot cause violent shocks when the brakes are automatically applied. The reader will notice that there was another costly wreck due to the automatic application of air-brakes, on the same day that the Glendale wreck occurred. The Prentice accident does not appear to be very clearly explained; but the case will at least serve as a reminder that protection from the unruly action of solitary cars, left unattended on windy nights, is not the only useful function of derailers at the ends of side tracks. Moreover, the importance of always having such derailers worked by the same lever that works the main switch is here forcibly shown. The collision at Valley City, N. Dak., will be of interest to Superintendents who are thinking of adopting green as the night all-clear color for signals.

Street Car Accidents.

Our record of accidents to electric cars in August includes 25 cases, mostly collisions and derailments, in which 14 persons were killed and 166 were injured. This is one of the most fatal monthly records of this kind that we have had occasion to publish; at all events, we recall none in which the casualties were so numerous, except in the few months in which there was a catastrophe, such as a loaded car falling off a bridge. Six different accidents appear to have been attended with fatal results in August. In at least four of the accidents in the present record there was a freight or work train involved, or some car other than a passenger car. The increasing frequency in the accident record of cases involving this class of cars is a reminder of the gradual extension of the functions of the electric railroad; when a passenger car on an electric road is smashed by a freight car full of wheat, which has escaped control on a steep grade, as was the case in one of the August collisions, it must be admitted that something besides old-fashioned "street railroad conditions" must now be dealt with.

One of the collisions, that at Brooklyn, N. Y., on the 17th, appears in our regular train accident record, the collision having occurred on a railroad where both steam and electric motors are used.

The most fatal accident in the present street car record was one at Chicago on the 17th, in which six passengers were killed and 10 were injured. This accident is described in a Chicago paper as follows:

"The accident occurred at Forty-seventh street and Stewart avenue, where a large number of railroad tracks run north and south at the street level. Across these the street car line runs at right angles. It is the custom of the conductors to run ahead of their cars and, standing upon the tracks, to signal the motorman to advance or remain stationary, according to the absence or presence of approaching trains. The street car, which was filled with passengers, came up to the tracks to-night from the west. The gates across the street car line were down, as a passenger train was moving rapidly south. Whether the motorman, Willis Bowman, was unable to control his car or whether he became confused and turned on the current is a matter of doubt. The car paused a moment as it approached the tracks, but before Conductor Fulton could alight to run ahead of the car there came a violent lurch, the car shot forward, passed rapidly across two intervening tracks and crashed into the passenger train. Had the car struck a passenger coach in the side the loss of life would not have been so great, but it struck between the rear end of the second coach and the front end of the third. It was caught up, whirled around, turned bottomside up and carried 50 ft. south of the crossing in a few seconds. At the time of the collision nearly all the passengers were inside the car, not more than two or three being on the platforms. Not one of them had the slightest warning of the accident or any chance to make an escape."

The annual report of the British Board of Trade on train accidents for the year 1900 was noticed in the *Railroad Gazette* of Aug. 16, page 574. The Board has now issued its supplementary "general report" in which the principal features of the returns are emphasized and commented upon. The proportion of passengers killed was one to 8,461,309. This computation, it will be remembered, takes no account of passenger mileage and does not include season ticket holders. The number of accidents investigated by the officers of the Board was 64. There are now two assistant inspecting officers who, besides performing the usual functions of their offices, will hold inquiries into the more important cases of accidents to employees. The two worst accidents in the year, which, together, caused the death of 12 passengers, have been already reported in the *Railroad Gazette* (Glasgow, March 28, reported Oct. 26, p. 706, and Slough, June 16, reported Dec. 7, p. 810). One of the inspecting officers calls attention to the fact that the warnings conveyed by accidents are soon forgotten by employees not concerned in the actual occurrences, and he recommends that accidents which have a lesson for railroad employees generally should be made known to such employees. Whether this suggestion has ever before been officially made in England we do not know; but if the inspectors read the *Railroad Gazette* they may have observed that the very commendable practice here proposed was in force on the Fall Brook Railway 15 years ago, and that it has since been adopted by many other American railroads. The same inspector further makes the recommendation, obviously a wise one, that offenses against the rules of block working, whereby the lives of passengers are imperilled, should be severely dealt with, whether attended by an accident or not. The report says that the rules, drafted by the Board of Trade under the law of 1900 for the prevention of accidents to employees, are now under consideration, in connection with the objections which have been presented by the railroads; and it is hoped that the rules may be brought into operation soon. Since the death of Sir Francis Marindin, the chief inspecting officer of the board is Lieut. Col. H. A. Yorke.

The August Summary of the Bureau of Statistics shows that during the eight months ending with August, 1899, the value of passenger and freight cars exported from the United States for steam railroads was $1,459,728. For the same period in 1900 it was $2,116,369, and in 1901, $2,654,985, an increase of $1,195,257 in two years. The total amount of steel rails exported for this period in 1899 was 158,937 tons, valued at $3,440,535, or $21.65, approximately, per ton. During the same eight months in 1900, 256,276 tons of rails were exported, with a value of $7,761,711, or in round numbers $30.21 per ton, and this year up to Sept. 1, the exports amounted to 249,281 tons, with a value of $6,715,113, or $27 per ton. During the first eight months of 1899, 363 locomotives were exported, with a total value of $3,636,792, or an average of $10,018 each. The figure in 1900 was 329 locomotives worth $3,481,407, an average of $10,551, and until September, this year, 333 have been exported, with a value of $3,050,246, an average price of $9,159. The total export of iron and steel, not including ore, for the first eight months of 1899 amounted to $68,008,070; in 1900, to $87,174,209, and this year to $69,346,379.

We have recently noted the important action of the British House of Lords in deciding that a trade union is liable to a civil action at law for damages if, as in the case of a strike, it injures the business of an employer—or of anyone else, for that matter. Recent London papers say that the Taff Vale railroad is not going to be content with a merely theoretical victory, but has brought action against the Amalgamated Society of Railway Servants for about $100,000 for losses sustained by the company during the strike of last year. The members of the Society, at its annual meeting, recently held, appointed a committee to draft a new constitution, with the purpose, no doubt, of protecting the funds of the Society so that they cannot be impaired in actions such as that of the Taff Vale Company.

The Convention of the Street Railway Association.

This year's convention of the American Street Railway Association at Madison Square Garden, New York, Oct. 9 to 11, is generally considered the best in attendance and exhibits that the Association has held. Wednesday and Friday were taken up with regular routine and reading and discussion of papers. Thursday was set apart for inspection of exhibits. The annual dinner was held at Sherry's Friday evening, when the newly-elected officers were installed. Various excursions from and within the city were made at other times during the convention. Among these trips were an automobile run to Claremont and a trip of inspection to the Bethlehem Steel Works at South Bethlehem, Pa.

Following is a list of titles of papers prepared, to some of which, with the discussion, we shall later refer more fully:

"Street Railways: A Review of the Past and a Forecast of the Future." By Robert McCulloch, General Manager, Chicago City Railway Co., Chicago, Ill.

"The Adoption of Electric Signals on Suburban and Interurban Railways, Single or Double Track, and Their Economy of Operation." By William Pestell, Superintendent of Motive Power, Worcester Consolidated Street Railway Co., Worcester, Mass.

"The Value of Storage Batteries as Auxiliaries to Power Plants." By W. E. Harrington, Vice-President and General Manager, Camden & Suburban Railway Co., Camden, N. J.

"The Public, the Operator and the Company." By C. S. Sergeant, Vice-President, Boston Elevated Railway Co., Boston, Mass.

"The Best Method of Conducting the Return Circuit to the Power House." By E. G. Connette, Vice-President and General Manager, Syracuse Rapid Transit Railway Co., Syracuse, N. Y.

"The American Street Railway Association: The Purpose of its Organization and the Benefits Accruing to Investors in, and Operators of Street Railway Properties by Membership Therein." By G. W. Baumhoff, St. Louis, Mo.

"The Economies Resulting from the Use of Four Motors Instead of Two on Double Motor Equipments."

"The Best Form of Car for City Service: A Consideration of the Various Types of Car as to Size of Car and Arrangement of Seats, Including Best Types of Brakes and Wheels." By Eugene Chamberlain, Superintendent of Equipment, Brooklyn Rapid Transit Co., Brooklyn, N. Y.

"Practical Results Obtained from Three-Phase Transmission and Rotary Transformers or Motor Generators in Transmitting Power on Railway Lines."

"Relations of Interurban and City Railways." By Ira A. McCormack, General Manager, Cleveland Electric Railway Co., Cleveland, Ohio.

"The Modern Power House, Including the Use of Cooling Towers for Condensing Purposes." By J. H. Vail, Philadelphia.

"Alternating and Direct Current Distribution." By M. S. Hopkins, General Manager, Columbus Railway Co., Columbus, Ohio.

Officers for the ensuing year were elected as follows: President, H. H. Vreeland, of New York; First Vice-President, C. W. Wason, of Cleveland, Ohio; Second Vice-President, E. C. Foster, of Boston; Third Vice-President, H. M. Sloan, of Chicago; Secretary and Treasurer, T. C. Penington, of Chicago.

Members of the Executive Committee: Walton H. Holmes, of Kansas City; John A. Rigg, of Reading; D. B. Dyer, of Augusta; T. J. Nicholl, of Rochester; G. W. Dickinson, of Seattle.

From among the many attractive exhibits we here note a few of the most prominent:

Adams & Westlake Co., Chicago.—Car trimmings.

American Brake Shoe Co., Chicago—Brake shoe for steam and electric roads.

Armspear Mfg. Co., New York.—Lamps and lanterns.

Atlas Railway Supply Co., Chicago.—Rail joints.

R. Bliss Mfg. Co., Pawtucket, R. I.—Full size models of the Wood safety car gate.

J. G. Brill Co.—The Brill convertible car, the new open car, and the semi-convertible car were shown in full size sections of car bodies. Various kinds of solid-forged sidebars and the No. 27, No. 27-G, No. 21-E and No. 22 trucks were exhibited. The collection of trucks, cars and component parts occupied a large part of the east end of the floor space, and was a much-visited part of the display.

Brooklyn Rapid Transit Co.—One of the new semi-convertible cars, designed by Mr. Eugene Chamberlain and built at the company's Fifty-second street shops, was exhibited. Brill Eureka Maximum Traction trucks, Consolidated Car Heating Co.'s electric heaters and Westinghouse Electric & Mfg. Co.'s power equipment are used. The car complete attracted much favorable comment, and the seating arrangement was the novel and most conspicuous feature. Chairs, made by the Heywood Bros. & Wakefield Co., Wakefield, Mass., are set in pairs, normally at slightly less than a right angle to the length of the car. The chair next to the window is thus somewhat ahead of the aisle chair. The chairs can be rotated completely in pairs, and in rush hours are swung to positions making a continuous line of side seats, each pair of chairs being then at a slight angle to the side of the car.

Christensen Engineering Co.—A large exhibit, including motor compressors Nos. 1 to 4, ranging from 2 to 10 h.p.; also their axle-driven compressors. Two complete systems of air-braking apparatus were operated; one system for single cars, the other for cars in train, the former being direct air and the latter automatic. Engineers' valves, triple valves and other parts were shown.

Consolidated Car Heating Co.—Standard types of electric heaters in operation and samples of the order for 21,000 heaters, to be furnished the Manhattan Elevated Railway Co. Also one heater from an order of 50 cars of the Boston Elevated Railway. An exhibition test of a heater that was in service eight years, to show that the resistance remains unchanged. Fittings and hangers used under different kinds of car seats.

Continuous Rail Joint Co. of America, Newark, N. J.—Rail joints.

Corning Brake Shoe Co., Corning, N. Y.—Samples of brake shoes for steam and electric service.

Curtain Supply Co., Chicago.—Car curtains and fixtures.

Duff Mfg. Co., Allegheny, Pa.—Samples of Barrett jacks.

General Electric Co.—Covering about 250 sq. ft. near the main entrance of the Garden, and inviting with palms and apt arrangement it was a favorite rallying place. The principal feature was the type M Control for electric railway motors, of which 900 equipments have been sold to the Manhattan Company. This was shown in actual operation, a sign with incandescent lamps being substituted for the motors by means of which the rise in voltage, which is comparable with the rise of speed in electric motors, is shown by the varying brilliancy of the filaments of the lamps. The electrically operated oil circuit breaker for 11,000 volts was also shown in practical operation. This is the type of switch to be used extensively by the Manhattan Company. There were also direct and alternating current switchboard panels similar to those furnished the Manhattan Company for use in New York City. A unique feature was the section of underground conduit showing the construction followed by the Metropolitan Company in this work, the electrical equipment for which is furnished by the General Electric Company. Two of the big G.E.-66, 125 h.p. motors which will be used by the Manhattan Company were shown, and also other railway motors of the various types used in modern railway apparatus. Electric brakes were also shown. Grooved trolley wire and line material required in its installation formed an interesting part of the exhibit. There were also collections of repair parts and supplies made by the company. At the middle of the company's space there was a comfortable reception space.

Gold Street Car Heating Co., New York.—A full line of electric car heaters, and one complete equipment for a car as used on the Boston Elevated Railway, the Brooklyn Rapid Transit, the Chicago City Railway and the New York, New Haven & Hartford Railroad.

Gould Storage Battery Co.—Samples of spinning plates to increase active surface contact; samples of all-metal tanks; sample of battery installed for the New York Commercial Building, and types of plates for railway and central station work.

Haywood Bros. & Wakefield Co., Wakefield, Mass.—Car seats. The company called attention especially to a new type of revolving chairs for street cars, the invention of Mr. Eugene Chamberlain, of the Brooklyn Heights R. R.

H. W. Johns Mfg. Co., New York.—Overhead line materials; molded mica and vulcabeston insulation and the Johns' electric car heater.

McGuire Mfg. Co., Chicago.—Royal flush fenders; Columbia car heaters; trucks; brake handles, and other street railroad supplies.

National Lock Washer Co., Newark, N. J.—Car window fastening and a new style of curtain fixture recently put on the market.

Pantasote Co., New York.—Full line of samples of Pantasote for car curtains and seats.

Pearson Jack Co., Boston, Mass.—Pearson car replacing jacks and the Mogul spike and bolt puller.

Peckham Mfg. Co.—Price Hydraulic Friction Brake in operation, mounted on Peckham 14 B3 center bearing swing bolster truck. Pair of improved center bearing swing bolster maximum traction trucks, with inside brakes. Part of order for 30 pairs for Metropolitan R. R. Co., Washington; one No. 14 A XX truck, one No. 26 high-speed truck, one M. C. B. No. 30 heavy high-speed truck, from order of sixty, for Chicago, Aurora & Elgin R. R. Co.; one No. 15 heavy high-speed double truck, from order for 30 for Cleveland, Elyria & Western R. R. Co.; one "Metropolitan Special" No. 11, single truck, from order for 48 for Rochester Ry. Co.; one Excelsior 7D "Cincinnati Special" truck, for Chicago & Joliet R. R. Co.

Pennsylvania Steel Co.—This exhibit was chiefly of track material, including anvil-faced frogs, of which the bearing points are of special steel, and adamantine construction street railway work showing hardened cross-over and switch points. The exhibit space was enclosed with a railing made of rails, 60-lb. section, and having illuminated switch stands for posts. An attractive collection of photographs of bridge work was there, most interesting of which were views of the Gotkeik viaduct, recently built in British Burmah in the face of sharp British competition. Mr. Charles S. Clark, Boston agent of the company and prominent in street railway matters, was in charge of the exhibit.

Standard Paint Co., New York.—Samples of "P and B" products, including electro compounds, armature and field coil varnish, insulating tape and preservative paints.

Standard Traction Brake Co. (Westinghouse).—The star feature of the exhibits was that of this company. A Brill closed car equipped with the Westinghouse magnetic brake and car heater (described in the *Railroad Gazette*, June 28 and July 26, 1901), and working on 121 ft. 6 in. of track in the center of the Garden. There was 39 ft. 6 in. of level track and the remaining 82 ft. had 4 per cent. grade. Exhibition runs were made every five minutes, showing service and emergency stops and also the perfect control in drifting. It was a most impressive demonstration throughout. This department also exhibited a D-1 Westinghouse motor-driven compressor, A C N, A C B and A C D duplex-geared, axle-driven compressors, engineers' valves, an automatic regulator for compressors, an automatic current controller and a 10-in. diam. brake cylinder with automatic slack adjuster.

The Sprague Electric Co.—Multiple unit system of control. The exhibit was near the central portion of the hall and showed a complete train equipment of two motor cars and intermediate train line cars, with means for connecting up in various sequential and end to end relations. The controllers were of the type recently introduced on the Boston Elevated Railway and of 300 h.p. each. One was connected to four Lorain steel motors mounted on the floor and the other to four motors loaned by the Brooklyn Heights Railway Company, mounted on two of the latest Peckham trucks. The Sprague Electric Company was represented at the convention by Frank J. Sprague, Francis H. Shepard, George H. Hill, Henry G. Issertel, Alexander Henderson, S. H. Libby and H. M. Davis.

Weber Railway Joint Mfg. Co.—Samples of joints for rails from 70 to 100 lbs. section, and joints for 6-in. and 9-in. girders. An enlarged photograph of the first prize medal obtained at the Paris Exposition of 1900 was among the interesting decorations. The railing about this enclosure was like that of the Pennsylvania Steel Co.

Westinghouse Electric & Mfg. Co.—Westinghouse six types of railway motors; a Peckham truck equipped with two No. 49 motors; a Brill Maximum Traction truck with No. 81 motor; Baldwin-Westinghouse mine locomotive; railway power station switchboard; illuminated dial ammeter; illuminated dial voltmeter; round-type ammeter; round-type voltmeter; D. C. station lightning arrester; street car lightning arrester with choke coil; canopy switch; canopy circuit breaker; car fuse boxes; car diverter; car diverter column, partly assembled to show construction, and gears, gear cases, pinions and axle bearings.

William Wharton, Jr., & Co.—This exhibit was near the main entrance, and showed samples of special track work constructions, particularly their Manganese Steel Hard Center Work. The notable features of the exhibit were an artistically arranged center group, consisting of a crossing, switches, frogs, cast welded compromise joints and some pieces showing the ductility of manganese steel; also a portion of a curved crossing for electric underground conduit construction, such as this firm has been furnishing to the Metropolitan Street Railway Company, of New York, in a large number of layouts; also crossing and frogs of their solid manganese steel T-rail construction. Among the single pieces exhibited were the Nichols Protected Heel Tongue Switch, the Wharton Unbroken Main Line Switch and the Nichols Manganese Steel Steam Railroad Crossing, which attracted attention at former conventions. A number of fine photographs illustrating special work, layouts furnished to various cities in the Union and to foreign countries, adorned the exhibit. The firm was represented by Mr. William Wharton, Jr., President; Mr. Victor Angerer, Vice-President and General Manager; Mr. W. Rodman Wharton, Engineer; Mr. J. C. Robinson, Boston representative, and several others.

NEW PUBLICATIONS.

Moody's Manual of Corporation Securities. Second annual number. Large octavo, 1,512 pages. New York: John Moody & Co., 35 Nassau street. 1901. $7.50.

In noticing the first issue of this manual we described it at considerable length. This second issue is said to contain information on more than 3,000 industrial securities, 3,000 gas, electric light and street railway securities and 3,000 steam railroad securities. The scheme is to give a brief under the name of each of the corporations, showing something of the property, the nature of its securities, its financial situation, results of working, directors and officers. Besides this kind of information the volume contains lists of members of stock exchanges in various principal cities.

The Engineering and Mining Journal has now passed under the control of the gentlemen publishing the *Street Railway Journal*, the *Electrical World and Engineer*, etc., and is published by a company known as the Engineering and Mining Journal, Incorporated. Of this Mr. James H. McGraw is President, and Mr. Lucius S. Bigelow Vice-President and General Manager. The Editor-in-Chief is Mr. David T. Day, Ph.D., the Managing Editor, Mr. Edward W. Parker, and Mr. Frederick Hobart remains as Associate Editor. Mr. Hobart was for many years news editor on the *Railroad Gazette* and about 14 years ago went to the *Engineering and Mining Journal*. Dr. Raymond remains as special contributor.

Practical Electric Railway Handbook. By Albert B. Herrick. Pocketbook; flexible morocco, 407 pages. New York: Street Railway Publishing Company. 1901. $3.

A new art must develop a new literature, and the art of railroading by electricity has already developed a few admirable periodicals, and now the handbooks are beginning to appear. The preface to Mr. Herrick's book is dated Aug. 1, 1901, so that it must be up to date. He tells us that his "attempt is to collect under one cover all such data as is directly applicable to construction, testing or operation of electric railway systems, showing such appliances, structures and methods as have been adopted in practice by street railways in the United States." His first chapter is devoted to general tables, these being tables of weights and measures and of the properties of materials which may be found in many other books, and which perhaps might as well have been left out of this one; still this chapter only takes 29 pages. Another chapter is on testing, another one on track and a long one of 120 pages is devoted to the power station. Then we have the line, the car house, the repair shop, equipment and operation, with appendices on storage batteries and boosters, and on underground conduits. Under the chapter on track we find material which is often inquired for by our correspondents, namely, specifications for track in cities and in the country and examples of track construction. There are also specifications for equipment, and the various chapters are plentifully illustrated by examples from practice. The chapter on operation, which is very short, does not strike us as having much value. Indeed, we should say that the greatest value of the book is in its specifications and its selected examples of practice.

TRADE CATALOGUES.

Mr. McKinley's Buffalo Address is reprinted in pamphlet form, and given to those who ask for it, by Mr. M. H. Tarbox, Treasurer of the Boston & Lockport Block Co., Boston, Mass. The republication is well chosen for all manufacturers. "We must not repose in fancied security that we can forever sell everything and buy little or nothing. . . . The period of exclusiveness is past."

TECHNICAL.

Manufacturing and Business.

The Cleveland Twist Drill Co. has been awarded the gold medal at the Pan-American Exposition, the highest award.

The Hazelton Boiler Co., formerly of 122 Liberty street, New York city, has moved its main office to the works at Rutherford, N. J.

The Lunkenheimer Company has again carried off the highest honors and this time at the Pan-American Exposition by being awarded the gold medal on valves, lubricators and engine fittings.

John H. Finney, formerly at Washington, D. C., has been made Western Sales Manager of the Stanley Electric Mfg. Co., with office in the Monadnock Block, Chicago. V. W. Bergenthal, formerly at Pittsfield, will be engineer of the Western sales office.

Merrill-Stevens Mfg. Co., makers of railroad steel stock guards, have recently removed from Niles, Mich., to their new brick factory at Kalamazoo. Many machines in the shop are new and the company generates its own electricity, which is used for power and lighting.

The John N. Poage Mfg. Co., Cincinnati, Ohio, has appointed E. F. Luce General Sales Agent for the Poage water column and other specialties made by the company, with office at 218 LaSalle street, Chicago. The company is building an addition to its plant in order to better handle an increased business and to turn out some new specialties for track use.

The Ajax Metal Co. authorizes us to say that it has permission to give, and is prepared to give, to any motive power officer, reference to the officers of a railroad company which has 13,400 "Plastic Bronze" bearings under 100,000-lbs. capacity cars. This company reports to the Ajax Metal Co.: "There has never been a train delayed on account of hot brasses since adopting Ajax Plastic Bronze."

Prof. R. A. Smart has resigned his position in the Department of Experimental Engineering of Purdue University at LaFayette, Ind., and connected himself with B. F. Sturtevant Co., of Boston, Mass., with whom he will become the head of a department of experimental engineering which is being established for the purpose of investigating all problems relating to blower practice and of developing new and more efficient applications of the fan blower in all lines of industry.

The history of the S. A. Woods Machine Co. during the past 50 years is an interesting record of the uses of wood-working tools and the development of their automatic action in connection with different industries. The designing of new tools and the discarding of old patterns has been continuous, and is best shown by the fact that all of its wood-working tools for railroad use are now either absolutely new, or have been redesigned within a very few years. Railroad machinery is now one of the most important departments of the company's works at South Boston.

In another column we note the election of A. C. McCord as Vice-President and General Manager of the Illinois Car & Equipment Co. The progress of this company during the past 18 months has been most satisfactory. The Chicago works have been largely improved and their capacity increased. All the various departments have been enlarged and a saw mill has been added, enabling the company to produce, upon short notice, any dimension of lumber required for contracts. The actual output of cars has been increased to 33 a day, and plans are now under way to still further increase this output. In addition to the general enlargement, a steel shop has been added to turn out structural steel underframes and any structural iron parts for cars. In addition to the ordinary output of wooden cars, this shop has turned out during the past year 700 Pennsylvania box cars and 1,600 Santa Fe coal and box cars having structural steel center sills. A repair department also has been added where a large amount of repair work has been done for the various roads in the Chicago district. The Urbana works of the company, which have always been devoted exclusively to repair work, have been running full time on repair work for roads in the Pittsburgh and Ohio districts.

The Russell Snow Plow Co., 425 Tremont Building, Boston, Mass., has received orders for the following styles of Russell plows to be delivered this fall: New York Central & Hudson River, two double-track, wing elevator, size No. 2, two standard double-track, size No. 2 and three single-track wing elevators, size No. 2, all to be equipped with the Russell air flanger, Westinghouse air brake and train signal and Gould automatic couplers; Central R. R. of New Jersey, one standard double-track, size No. 2, equipped with Westinghouse air brake and air signal; New York, Chicago & St. Louis, one standard single-track, size No. 2, equipped with Russell air flanger and Westinghouse air brake and air signal; Somerset R. R., one standard single-track, size No. 3; Delaware & Hudson, one standard single-track, size No. 2; Bangor & Aroostook, five single-track, size No. 2, equipped with Westinghouse air signal; Lake Shore & Michigan Southern, two standard double-track, size No. 4, equipped with Russell air flangers, Westinghouse air brakes and train signals and Gould automatic couplers; Grand Rapids & Indiana, one single-track wing elevator, size No. 2, and Buffalo, Attica & Arcade, one single-track, type "Flyer

A." All of these will be built by the American Car & Foundry Co., and many are well under way.

Iron and Steel.

Charles T. Schoen, Chairman of the Pressed Steel Car Co., has become a Director in the Tidewater Steel Company.

N. M. Peterson, of Columbus, Ohio, has succeeded A. B. Carter as District Manager of the National Steel Co., at Bellaire, Ohio.

It is said that an agreement has been made by the bar iron makers which fixes a minimum price of $31 a ton, the new basis at the Pittsburgh mills.

The Ohio Steel & Iron Specialty Co. has been incorporated in New Jersey, with a capital of $75,000, by C. V. Childs, James P. Mapletoft and others.

Arrangements have been made by the Girard Trust Co. to redeem the scrip issued to holders of Bethlehem iron stock issued under the terms of the circular dated June 22.

Fred K. Bennett has resigned as Superintendent of the rail mill at the Ohio Works, Youngstown, to go with the Maryland Steel Co. He is succeeded by John Gardner.

The New Castle Forge & Bolt Co. has been organized and will build a plant in New Castle, Pa., to make bolts, nuts and chains. Thomas F. Moorhead, Wm. H. Cox and others are interested.

Wm. Jessop & Sons, Ltd., of Sheffield, Eng., have awarded a contract to the American Bridge Co., for the buildings, and to the Westinghouse Co. for some machinery for their American plant in Washington, Pa.

The Cuba Company has contracted with the Pennsylvania Steel Co. for 15,000 tons of 60-lb. rails. The Cuba Company, which is buying considerable material in this market, is located at 80 Broadway, New York. Sir William Van Horne, late president of the Canadian Pacific Railway, is President.

Pig iron production on Oct. 1, according to the *Iron Age*, was at the rate of 307,982 tons weekly, an increase of 8,121 tons over the output on Sept. 1, and 84,813 tons more than in October, 1900. Yet furnace stocks steadily decrease, amounting to only 361,593 tons, Oct. 1, against 670,531 a year ago, and supplies in consumers' hands are believed to be light.

The Pittsburgh *Post*, in its weekly iron and steel summary, on Oct. 10, says that about 60 per cent. of the nominal rail tonnage has been placed for shipment during the first months of 1902 at this year's rates. The contracts are not rushing as there is no need of extreme haste, but the movement of tonnage toward the rail mills is steady and it is anticipated that within another 30 days the bulk of the remaining 40 per cent. will be in the hands of the rail makers.

Compressed Air Motors for Chicago.

Two of the new compressed air motor cars, which have been limbering up on the Rome City Street Railway Co. are to be shipped to Chicago to go into service there at once on the Union Traction Co.'s lines, which company has had three of these motors in operation for the past two years.

The Massena Water Power Plant.

Last week, page 709, we said that water had been turned on the turbines at the Massena plant. This was said on the strength of a circumstantial account in the daily newspapers which it seemed hardly necessary to verify. We learn now that there is no truth in the story. Water may be turned on within a few weeks, but that event has not yet taken place.

Interlocking.

The Taylor Signal Company, of Buffalo, has about completed a large electric interlocking plant for the Union Pacific at Omaha. The signals of this plant cover the main track and the yard, constituting the approaches to the Union station, extending to the west end of the yard. There are two signal cabins, which contain an aggregate of 176 electric "levers."

The North Eastern Railway of England has ordered from McKenzie & Holland an electro-pneumatic interlocking plant, to be installed at Tyne Dock. There will be two cabins, the machine in one having 71 levers and in the other 35. The 106 levers will do work which, under usual English practice, would require 250 manual levers. The Westinghouse electro-pneumatic is thus now installed, or soon to be installed, on three important English roads, the North Eastern, the Lancashire & Yorkshire (71 levers at Bolton), and the Great Eastern. The plant on the latter (at Whitechapel, London) has been in use nearly three years.

Electric Light Plant for Greece.

Consul McGinley reports from Athens, Sept. 12, 1901, that the Mayor of Karpenesion, a village in the Province of Evrytania, wishes to have that place lighted by electricity, and has requested the consulate to publish the fact in the United States, hoping to induce some American company to sell him a suitable plant. There is a stream near the village that can be utilized to furnish the necessary power for the plant. There are 400 houses in the village, and the Mayor estimates that about that number of incandescent lights will be required. He does not mention the number of arc lights required.

Rolling Stock for Belgian State Railroads.

The annual estimates for new rolling stock for the Belgian State Railroads has just been approved and bids will soon be wanted. About 15,000,000 francs ($2,895,000) has been appropriated for 100 locomotives, type 32, for heavy freight traffic in transit; 20 locomotives, type 17, the same as those furnished by England, to be used for rapid and international trains; 35 locomotives, type 51; 180 tenders, of which 20 are to be of 18,000 liters, 100 of 13,000 liters, and 60 of 9,000 liters capacity. Sets of wheels and pairs of wheels for locomotives are included in the specification. Application for specifications and plans must be addressed to the Minister of Railroads, Post, and Telegraphs No. 11 rue Louvain, Brussels, Belgium.

German Locomotives for Denmark.

Henschel & Sohn, Cassel, Germany, have received an order from the Danish State Railroads for five mogul engines and five side tank switching engines. The approximate dimensions of these locomotives are as follows: Moguls, cylinders 16 in. x 24 in.; driving wheels, 54 in. in diam.; heating surface, fire-boxes, 96 sq. ft., tubes 1,053 sq. ft.; grate area, 19 sq. ft.; weight in working order 45 tons, of which 37 tons will be on the driving wheels; the tenders will have six wheels, each 43 in. in diam., and a tank capacity for 2,800 gals. of water. Switching engines, cylinders 12 in. x 20 in.; driving wheels, 42 in. in diam.; heating surface, fire-boxes, 42 sq. ft., tubes 461 sq. ft.; grate area, 8.5 sq. ft.; weight in working order 23.8 tons. The mogul engines will have Hardie's vacuum brake, and the switching engines screw and steam brakes.

Awards to Standard Paint Company.

In addition to the medal given by the Paris Exposition to the Standard Paint Co., New York, the Directors of the Exposition have recently awarded a special medal for the novelty of the company's exhibit. The Director of Architecture has also granted a special certificate covering the efficiency and durability of Ruberoid flooring, another product of the Standard Paint Co. This last-named material has been in use in the main corridors and stairways of the Engineering Building for more than three years and, although subjected to severe use, shows no perceptible wear. Another certificate has just been received from the Company of Portable and Transformable Buildings, Paris, testifying to the durability of Ruberoid floor cloth. This floor cloth is designed for floors of offices, storehouses and factories. It can be painted with ordinary oil paints and kept clean easily.

High Speed Trials in Prussia.

The experiments to test the practicability of extraordinary speeds on the Prussian Military Railroad began by attaching the two electric motor cars, one built by Siemens & Halske and one by the General Electric Co., to the latest type of Prussian express locomotive, and hauling them at various speeds up to the highest permitted on the Prussian State Railroads, namely, 90 k.m. (56 miles) per hour; this in order to test the electric cars, their brakes, etc. Everything having been found satisfactory, it remained to test the installation for conducting the electricity over the line (equipped for 15½ miles). When that had been done the trials of the motor cars themselves were to be made, beginning at moderate speeds and increasing to the highest attainable. It is not expected to reach a speed of 200 k.m. (124 miles) per hour as has been widely announced. The improvements of the road and its appliances and the whole construction of the cars was designed so that, so far as could be foreseen, a movement of 200 k.m. per hour would be safe. The whole experiment is to ascertain the greatest speed safely attainable. What that is, can be known only after the trials.

Pennsylvania and Cambria Steel Companies.

Direct working control of the Pennsylvania and Cambria Steel Companies has been assumed by the Pennsylvania Railroad, which holds a majority of stock in both of the metal companies. Effingham B. Morris, President of the Girard Trust Company, and a Director of the Pennsylvania Railroad, will succeed J. Lowber Welsh as Chairman of the Executive Committee of the Cambria Company. Mr. Morris is now at the head of the Pennsylvania Steel's executive committee. The directors of the Pennsylvania Steel Company, on Oct. 11, elected the following new board members: George F. Baer, President of the Reading Railway, to represent the holdings of that company; Theodore N. Ely, Chief of Motive Power of the Pennsylvania Railroad, and F. C. Smink, Vice-President and General Manager of the Reading Iron Company. Mr. Baer was chosen to fill the vacancy created by the resignation of J. Lowber Welsh. A new executive committee was appointed, including in its membership Messrs. Ely and Smink. Frank J. Firth, President of the Erie & Western Transportation Co., will be added to the Pennsylvania board and the executive committee. Messrs. Ely and Firth are Directors of the Cambria.

Large Low-Pressure Cylinders on Locomotives.

In our issue of August 30 we mentioned some reasons for thinking that the greatest allowable diameter of low-pressure cylinders on two-cylinder compound locomotives has not been reached, although closely approached. Among examples of the largest work of this kind are the low-pressure cylinders of the New York Central Class G-1, 35 in. diam.; Rio Grande Western, 36 in. diam.; Intercolonial, 36 in. diam., and some Baltimore & Ohio locomotives now being built at Schenectady with low-pressure cylinders 35¾ in. diam. These examples are all taken from work of the Schenectady and the Richmond works of the American Locomotive Company. The Richmond Works is now delivering to the Wabash Railroad an order for two-cylinder compounds which is of considerable importance, although the low-pressure diameter is not great enough to head the list of large proportions. There are 34 engines in this order and the low-pressure cylinders are 32½ in. diam. A well known designer of two-cylinder compounds gives his view of the matter as follows: "I know of no reason against using a 36-in. low-pressure cylinder or larger on two-cylinder compound engines for most railroads in the United States."

Brake Repairs at Nashville for August.

Air-brake cars cut out coming into Nashville Yard, Nashville, Chattanooga & St. Louis Railway, August, 1901:

Blowing at exhaust	55
Blowing at vent port	19
Triple valve needed cleaning	124
Triple piston packing ring worn out or broken	43
Triple valve gasket blown out	18
Check valve case gasket blown out	28
Graduating pin broken off	5
Graduating spring too short	1
Port in vent valve piston stopped up	7
Slide valve applied wrong	2
Sand hole in triple valve body	1
Other defects of triple valve	2
Release valve leaking	25
Brake cylinder release spring broken	2
Brake cylinder piston packing leather worn out	38
Brake cylinder gasket blown out	2
Brake cylinder piston loose	3
Unions leaking	17
Train line leaking or broken	50
Train pipe broken	10
Angle cock leaking	6
Angle cock and hose gone	1
Flat wheels	20
Brake rigging out of order	46
Total	525
Cars leaving Nashville with brakes cut out	65
Cars repaired	460

Air-brake cars cut out leaving Nashville Yard, August, 1901:

Number of air-brake cars forwarded	8,679
Air-brake cars O. K.	8,614
Air-brake cars cut out	65
Average serviceable air-brake cars per train	17.6

Of the 65 cars cut out there were:

Blowing at exhaust	12
Blowing at vent ports	3
Check-valve case gasket blown out	7
Triple-valve body broken	1
Sand hole in triple-valve body	1
Triple piston packing ring worn out	1
Release valve leaking	6
Train-pipe broken	5
Branch-pipe broken	3
Brake cylinder release spring broken	1
Brake cylinder gasket blown out	1
Brake cylinder packing leather worn out	3
Flat wheels	8
Brake rigging out of order	13
Total	65

Of the 65 cars cut out 43 belonged to railroad companies, 22 to private car lines. Of the air-brake cars forwarded, 7,538 were equipped with apparatus of the Westinghouse Air Brake Co., 1,139 with apparatus of the New York Air Brake Co., 1 with apparatus of the Landsberger Air Brake, 1 with apparatus of the Boyden Air Brake.

THE SCRAP HEAP.

Notes.

At the annual meeting of the Canadian Pacific, held last week in Montreal, it was decided to establish a pension fund for the employees of the road, and the sum of $250,000 was set apart as a nucleus for the fund.

General Manager J. M. Barr, of the Seaboard Air Line, has notified the employees of the company that those of them who insure against accidents with the Aetna Life Insurance Company, of Hartford, may have their premiums paid through the paymaster of the road; by making this special arrangement a material reduction is secured in the rates.

The Supreme Court of the State of Iowa decided in the case of the Minneapolis & St. Louis vs. the Cedar Rapids, Garner & Northwestern, that where a new railroad is projected to cross at grade a railroad already established, the older line may require the new line to equip the crossing with an interlocking crossing device entirely at the expense of the new line. The defendant company claimed the cost of interlocking should be divided between the two companies, but to make such requirement, the court holds, would be unconstitutional.

Chicago papers state that Illinois Central, after a conference with representatives of the conductors' and brakemen's brotherhoods, has promised to increase the wages of train and yard men to the amount of $400,000 or $500,000 a year. It appears that the company has agreed to allow trainmen for overtime after 11 hours, and to pay for such overtime 33 cents an hour. The reporters say that there are 5,000 men affected, which would mean that the increase is to be $100 a year to each man. This, no doubt, is merely an estimate. The Illinois Central, which has recently taken control of a number of other railroads, now has over 100 yards where switching crews are employed. It is said that hereafter uniform rates of pay will prevail in these yards, foremen receiving $65 a month and helpers $60.

The "third rail eye," which has caused considerable light newspaper talk at Boston, is a bugbear which proves on investigation to be of very small proportions. Since trains have been running on the elevated railroad of that

city the physicians have been called upon to treat a largely increased number of persons with particles of iron or steel in their eyes, and as the elevated line, worked by electricity, has a third rail, the friction of the shoe on this rail was credited with causing all of the trouble. But Mr. E. K. Turner, C. E., who, at the request of the State Railroad Commissioners, has looked into the matter, finds that, as on other elevated roads, the particles of iron falling to the street come mostly from the rubbing of the brake shoes on the wheels, and he estimates that only 4 per cent. of the particles which make trouble can be traced to the third rail.

Traffic Notes.

Serious blockades of freight are reported at Pittsburgh, at St. Louis and other cities. At St. Louis a strike of teamsters has aggravated the congestion in the freight yards.

The "Akron route" through-car line, which has been operated between Buffalo and the Southwest by the Erie and the Pennsylvania, during the heavy passenger travel incident to the Pan-American Exposition, is to be abandoned Oct. 27.

The flour millers of the West, who have long been complaining because export wheat is carried by the railroads cheaper than export flour, have laid their complaint before the President of the United States, requesting him to mention their case in his coming message to Congress.

The war among the railroads carrying coal to Memphis, which has forced rates down to a very low figure, is in process of settlement, the contestants having agreed to have the question of rates arbitrated by Mr. S. R. Knott, President of the Kansas City Southern, who formerly was an officer of the Louisville & Nashville.

Concerning Blacksmith Shops.

At the Denver meeting of the Master Blacksmiths Mr. Quereau made the following suggestions, which will be made the subject of reports next year:

"I see no reason why you should not have a smokeless blacksmith shop. There are such, and it occurs to me that it would be much more comfortable for the men working over the forge. I would also offer a suggestion as to the best plan for location of the blast pipe. Usually it is under ground, where it rusts. Another suggestion is in regard to piece work. It has occurred to me that because of the very large amount of money which is invested in the time it takes to heat the iron and get it ready for actual work, there might be a decided difference."

New Trans-Atlantic Line.

Lord Strathcona, a large shareholder in the Canadian Pacific, is reported making arrangements with the Canadian Government for a fast line of steamers to run between Sydney, Cape Breton, and Queenstown. The distance by this route is 860 nautical miles less than that now in use. The port in the winter time would probably be Halifax, and the line in question would be run as an Atlantic link with the Canadian Pacific, connecting with this company's Pacific fleet from Vancouver. The Bank of Montreal is said to be behind the project through its Manager, E. S. Clouston. Tenders are to be called for in November.

South American Notes.

The Minister of Public Works has reviewed favorable plans for a proposed line across Buenos Ayres, from Chacabuco to the Andes by way of Trenel. The main line of the road will be some 500 kilometers long, and the Andes are to be reached by an extension of an equal length. The Committee of the Chambers is also favorable to the scheme and it is thought that a bill will be introduced shortly to authorize the building of the line.

The first modern grain elevator in the Republic is to be built at Buenos Ayres for the joint use of the Buenos Ayres & Rosario and the Central Argentine railroads. It is to be built of steel, with cement floors, and will have 100 steel storage tanks, with a capacity of approximately 750,000 bushels of wheat. The capacity of the six loading elevators, when working together, will be 1,000 tons an hour.

The contract for an underground railroad in Buenos Ayres from the water front across the city to the western suburbs, has been approved and Mr. Bright, to whom the concession was granted, is authorized to transfer it to the Metropolitan Ry. of Buenos Ayres.

The Argentine Government has been petitioned for concessions for a number of light railroads. Permission is asked in some cases to use streets and public roads for these lines which are to run from Campana across both lines of the Central Argentine, and both lines of the Rural Tramway to Mercedes on the Pacific & Western. Lines are also asked for from Baradero to Arrecifes, on the Central Argentine; from San Pedro across the main line of the Central Argentine to the Junin-San Nicolas branch of the same, and any other routes across-country to the river ports in order to secure cheap transportation by water.

German Railroads in China.

The Shantung Railroad Company, whose head office is in Berlin, has been informed of the opening of another long section of its road, whereby a line of 62 miles has been completed. The work is being energetically pushed, and the directors believe that by May of next year the road will be in operation up to Weihsien, where the great land routes of the northern part of Shantung province converge. Ten miles south of Weihsien the road runs through one of the main coal fields, and by the middle of next year coal from there will reach Tsintau, which will add to the importance of that port. The surveys on the line Weihsien-Tsinganfu are finished for 25 miles.

Dining Cars in Japan.

The dining car has made its entry into Japan. Four, as like as possible to the familiar American pattern, have been built at the government shops for the line between Tokio and Kobe, in which the traveler may ply his chopsticks at his leisure. But it is not expected that the natives will make much use of them, but chiefly foreigners, who often do not know what to make out of the unfamiliar Japanese dishes plentifully offered them at the stations.

American Engineers in Russia.

The new German monthly periodical, *Russia and Germany*, contains a long article concerning the commercial relations between Russia and the United States. It notes that although the trade between the two countries is not yet large, American enterprise has gained triumphs in another field in Russia. The transportation problems in the Asiatic possessions resemble those solved in the United States. American engineers have rendered valuable services in the Manchurian Railroad and the East Siberian line. In European Russia, also, the Government is availing itself of their experience. The ice-breaker "Jermak" was modeled on those employed on the Great Lakes in the United States. An American has shown Russia how to dredge her rivers at a great saving of expense. The journal adds: "These facts show that American competition, even if to-day it does not figure formidably in the trade of Russia, will surely be felt in this rich country in the future. The advantages of the Americans must be offset by a new German-Russian treaty. The German is much superior to the American in adapting his goods and his mode of conducting business to the requirements of the Russian market."

Floating Dry Dock for Odessa.

The Societa Fiumana di Costruzione Navale Howaldt Company has just finished a floating dry dock for the Russian Steam Navigation & Trading Company, of Odessa, and is now on its way, being towed by two steamers. The voyage is expected to take at least 30 days. It has a lifting power of 4,800 tons and can raise a vessel of this weight in two and one-fourth hours. Constructed in two parts, it has the advantage of putting only one-half into action, in case a smaller vessel is to be lifted. One part is built on four pontoons, each 11 ft. $1^{5}/_{16}$ in. high and 53 ft. long, having a lifting power of 2,740 tons. The other part is built on three pontoons, each of the same dimensions, having a lifting power of 2,060 tons. The total length is 381 ft.; width, 63 ft.; width of walls, 8 ft. 4¾ in. It is fitted with electric light and accommodations for office and cabin for crew.

The Spread of the Yankee Idea.

The company which works the electric street railroads in Vienna has petitioned the Austrian Railroad Ministry to withdraw the regulation which prohibits passengers getting on and off the motor cars while in motion. The conductor, it says, hasn't time to prevent it. The authorities of the province in which Vienna is situated has approved this petition, and it is expected that it will be granted. Several people in New York have been following this forbidden practice and have not even thought of asking the State Engineer and Surveyor for his permission.

New Docks of the Lackawanna Railroad.

When the Lackawanna Railroad finishes its new docks on the Hudson, at Jersey City and Hoboken, it will have a dock frontage of about 35,000 ft., covering the water front for about 2,600 ft. There are 13 piers, each about 150 ft. apart. The work has been going on for some time and will cost $2,500,000.

Naval Construction Work.

According to the report of the Naval Bureau of Construction, made public last week, work on four battleships, the "Virginia," the "Nebraska," the "New Jersey" and the "Rhode Island," two armored cruisers, the "South Dakota" and the "California," and three protected cruisers, the "St. Louis," the "Milwaukee" and the "Charleston," the contracts for which were let last winter, has not yet been begun.

The battleships now building are the "Georgia," the "Maine," the "Missouri" and the "Ohio." The armored cruisers that are now building are the "Colorado," the "Pennsylvania," at the Cramps Works; the "West Virginia" and the "Maryland" at Newport News.

The "Cleveland," at the Bath Iron Works; the "Denver," at Neafie & Levy's; the "Des Moines," at Fore River; the "Chattanooga," at Nixon's; the "Galveston," at Trigg's, and the "Tacoma," at the Union Iron Works, are the protected cruisers that are now building. There are also four monitors and several submarine boats building; also 16 torpedo boat destroyers.

Relocation to Abolish Grade Crossings in East Boston.

Meetings have recently been held in East Boston to consider plans for the abolition of the grade crossings. Associate Justice Joseph H. Barnes, Jr., at the meeting held Oct. 8, presented plans and estimates of relocations of the tracks of the Boston & Maine and Boston & Albany railroads. Bridging or depression of the tracks is not considered to be advantageous to East Boston. It would cost in the neighborhood of $800,000, while the relocation plan, which provides for the tracks going around the extreme southeasterly portion of East Boston, parallel with the tracks of the Boston, Revere Beach & Lynn railroad, and thence around Jeffries Point would cost only a few thousand dollars more.

Westinghouse Company to Build Its Third Town.

The Westinghouse Co. has bought some 600 acres of land for a new town site and new foundry plant at Stewart Station on the Pennsylvania R. R., a short distance east of Pittsburgh, Pa. The town will be known as Trafford Park. The company has now three foundries, one in Pittsburgh, one in Allegheny and a third in Cleveland; and it is intended to consolidate the Allegheny and Cleveland foundries in the new town.

A Good Roads Train on the Southern.

In pursuance of the policy of developing territory tributary to its lines a "good roads train" of 10 cars is to soon be sent out by the Southern from Washington under charge of President W. H. Moore of the National Good Roads Association. The train is to stop at various points in the South to build sample roads and stir up interest among the residents in the subject. All necessary road building machinery will be carried on the train and operated by a corps of road experts. It will be well remembered that the Illinois Central ran such a train over its lines a few months ago.

LOCOMOTIVE BUILDING.

The Vandalia has ordered five switching engines from the Baldwin Locomotive Works.

The Colorado & Wyoming has ordered three engines from the Baldwin Locomotive Works.

The Chicago, Burlington & Quincy will, it is reported, build a few locomotives at its Aurora shops.

The Duluth, South Shore & Atlantic has ordered four locomotives built by the Rogers Locomotive Works.

The Missouri Pacific has ordered 65 locomotives from the American Locomotive Co., to be built at the Brooks plant.

The Pere Marquette has ordered 10 10-wheel locomotives from the American Locomotive Co., to be built at the Brooks plant.

CAR BUILDING.

The Illinois Central has ordered 500 freight cars from Haskell & Barker.

The Chicago Junction has ordered 100 gondola cars from Haskell & Barker.

S. M. Willock is having five freight cars built by the American Car & Foundry Co.

The Lehigh Valley has ordered two box cars from the American Car & Foundry Co.

The General Chemical Co. is having 15 cars built by the American Car & Foundry Co.

Swift & Co. have ordered 100 more refrigerator cars from the American Car & Foundry Co.

The Waukegan Tank Line is having five freight cars built by the American Car & Foundry Co.

The Chicago Great Western is having 20 freight cars built by the South Baltimore Car Works.

The Choctaw, Oklahoma & Gulf is having 50 freight cars built by the Illinois Car & Equipment Co.

The Lake Shore & Michigan Southern is reported to have ordered 1,500 box cars from Haskell & Barker.

The St. Louis & San Francisco has ordered 500 coal cars of 80,000 lbs. capacity from the American Car & Foundry Co.

The Chicago, Burlington & Quincy has ordered 800 box cars from the Pullman Co., and is asking bids on 1,000 gondola cars.

The Costa Rica is having 240 freight cars built by the Lancaster Railway Carriage & Wagon Co., Ltd., of Lancaster, England.

The Pittsburgh & Lake Erie has ordered 1,000 steel hopper bottom coal cars of 80,000 lbs. capacity from the Pressed Steel Car Co.

The Chicago, Rock Island & Pacific will build, at its Horton shops, 100 box and 100 stock cars; and at its Chicago shops, 100 coal cars.

The Pere Marquette has ordered 12 combination coaches from the American Car & Foundry Co., as reported in our issue of Oct. 11.

The Cold Blast Transportation Co. is reported to have taken advantage of its option on 100 refrigerator cars with the American Car & Foundry Co.

The American Car & Foundry Co. has received orders for 29 tank cars, 30 logging cars, 150 mine cars and 39 miscellaneous cars from individual concerns.

The Chicago, Burlington & Quincy has ordered 800 box cars of 80,000 lbs. capacity. They will weigh 36,100 lbs., and measure 40 ft. long, 8 ft. 6 in. high and 8 ft. wide.

BRIDGE BUILDING.

BAY CITY, TEXAS.—It is said the County Commissioners of Matagorda County and some citizens of Bay City will build a pontoon bridge across the Colorado River at Bay City.

BOSTON, MASS.—Bids are wanted by City Engineer William Jackson until Oct. 24 for rebuilding the piers of Broadway bridge over Fort Point Channel. Plans may be seen at his office.

BUFFALO, N. Y.—The Department of Public Works wants bids, Oct. 23, for rebuilding the counter weights on the Michigan street bridge over Buffalo River, in accordance with plans and specifications on file in the office of the Bureau of Engineering. R. G. Parsons, Secretary.

COLORADO SPRINGS, COLO.—A new bridge will be built over Fountain Creek, on Tejon street, by the County Commissioners and the Colorado Springs Rapid Transit Ry. It is said bids will soon be wanted and the cost is estimated between $10,000 and $15,000.

COLUMBUS, GA.—At the election of Oct. 10, it was voted to issue $40,000 of bonds for the proposed steel bridge over Chattahoochee River at the west end of Fourteenth street.

DAWSON, NEW MEXICO.—Contracts will be let about Jan. 1 for building the Dawson Ry., which includes some bridge work, principally a 200-ft. bridge over the Rio Grande River. G. C. W. Lowrey, Vice-President, New York.

DOVER, TENN.—County Court has voted to build two bridges in Stewart County this year. One will be across Elk Creek at a cost of about $1,600, and the other one, across Cross Creek, will cost about $3,000. Both will be on the road from Cumberland City to Dover.

GLENROCK, WYO.—The Commissioners of Converse County have ordered a new bridge over the North Platte River near Glenrock.

HELENA, MONT.—The County Commissioners will build a new bridge over the Missouri River and are considering three possible sites. T. R. Hinsdale, County Surveyor.

INDO-CHINA.—A steel bridge for the French Colonial Government will be built over River Day, on the line of a railroad from Hanoy to Sontay, in Indo-China. Plans and specifications may be had of the Inspector-General of Public Works for the Colonies. Bids are to be with the Minister of Foreign Affairs, Paris, France, by Oct. 26.

KANSAS CITY, MO.—The ordinance authorizing the Allen avenue viaduct was passed by both branches of the City Council on Oct. 7, and has been signed by the Mayor. The viaduct is to begin at Twenty-third and Brooks streets and cross the tracks of the Atchison, Topeka & Santa Fe, the Kansas City, Fort Scott & Memphis and the Burlington railroads. The estimated cost is $80,000. The city is to pay no part of the expense. The Metropolitan Street Ry. Co. will pay one-half, the Kansas City Stock Yards Co. $10,000, and the remaining cost is borne by the three railroads. The total length of the structure will be 1,905 ft., 40 ft. 8 in. wide. The approaches will each be about 610 ft. It will carry two lines of trolley track and will be designed after Cooper's 1896 highway specifications.

LAFAYETTE, IND.—The Tippecanoe County Commissioners will build a new iron bridge to replace the burned wooden bridge which spanned the Wabash River at Brown street.

LUDLOW, MO.—Contract will be let, Nov. 6, by J. Y. Powell, Bridge Commissioner, for a steel bridge over Shoal Creek, 1½ miles south of this place.

MORGANTOWN, W. VA.—Major Chas. Powell, Corps of Engineers, U. S. A., in charge of the Monongahela River,

has notified the County Court that the suspension bridge over the Monongahela River must be raised 14 ft.

NAUVOO, ILL.—The Highway Commissioners are about to receive bids for a steel bridge of 108-ft. span over Chey Creek. W. F. Hartenstein is a member of the committee.

NEW SOUTH WALES.—Some time ago we reported that bids had been invited by the New South Wales Government for a bridge over Sydney Harbor. It may be well to state again that the bids close Feb. 28, 1902. The total length of the bridge will be 3,000 ft. Information can be had of the British Consul, Mr. Percy Sanderson, 17 State street, New York.

NEW YORK, N. Y.—In connection with the plan for extending Riverside Drive from the northern end of Manhattanville viaduct to connect with Lafayette Boulevard, a steel bridge will be built over 145th street.

PEORIA, ILL.—A committee has been appointed to have a bridge built at Bridge street. The Mayor is a member of the committee.

PITTSBURGH, PA.—The contract for building the cantilever bridge for the Pittsburgh, Carnegie & Western (Wabash R. R.) over the Monogahela River from the foot of Ferry street, has been awarded to the Pennsylvania Steel Co.

According to report, plans have been made by the Monongahela Traction Co. for a steel bridge to cost about $60,000, to connect Rankin, East Pittsburgh and North Braddock. Contract will soon be let. G. S. Davison, General Manager.

RICHMOND, QUEBEC.—According to report, the Richmond County Electric Co. proposes to recover the superstructure of the St. Francis bridge, which lies at the bottom of the river, and rebuild it between Richmond and Melbourne.

ROME, N. Y.—The New York Central & Hudson River R. R., according to report, will replace a number of bridges along the Rome, Watertown & Ogdensburg.

RUSSIA.—In our issue of Aug. 10, we stated that the city of St. Petersburg wanted competitive bids for two bridges which would cost about $1,802,500. Technical particulars, plans of the sites, etc., in Russian, French, German or English, as desired, may be had on request by addressing St. Petersburg Gorodskaja Uprawa, St. Petersburg. The last date for receiving competitive building schemes is Sept. 1-14, 1902.

SOUTH AFRICA.—Twenty-two bridges will be built on the Natal Government Railways. Two will be of 20-ft. span, eight of 15-ft. span and 12 of 100-ft. span. Address the Agent-General for Natal, Victoria street, London, S. W., for particulars. No date is set for closing of bids.

SULLIVAN, MO.—Chas. W. Reenes, County Surveyor, Milan, Mo., tells us that he will receive bids on Oct. 22 for three steel bridges in Sullivan County, to cross Locust and Spring creeks.

TOPEKA, KAN.—The Atchison, Topeka & Santa Fe, according to report, is considering building a viaduct at Branner street.

TWO RIVERS, WIS.—It is said the City Council and the Chicago & North Western R. R. have asked the Government for permission to build a railroad bridge across West Twin River.

VERNAL, UTAH.—Plans and specifications of the proposed bridge at Vernal, across the Green River, are now on file at the office of the Engineer, E. F. Harmston, and bids are being solicited for the structural material.

WASHINGTON, PA.—The Street Committee is considering building a bridge across Baird avenue, between Broad street and Addison street.

WESTBURY (LONG ISLAND), N. Y.—The State Board of Railroad Commissioners has granted the petition of the Long Island Railroad as to the following grade crossings: The grade crossing at Covert street or Hempstead road, east of the Westbury station, to be closed and discontinued, and an overhead bridge crossing be built at the Jerusalem road or Old Farm road. The grade crossing known as the Jerusalem road or Old Farm road, east of the Westbury station, to be closed and an overhead bridge crossing to be built at the location of the present crossing.

Other Structures.

ALIQUIPPA, PA.—The Pressed Steel Car Co. has recently bought 40 acres of land near Aliquippa station, on the Pittsburgh & Lake Erie R. R., where a large axle and car wheel plant will be built.

BALTIMORE, MD.—The Baltimore & Ohio contemplates making extensive improvements to its Mt. Clare shops at a cost of about $65,000 for building and as much more for machinery.

CHICAGO, ILL.—Messrs. Frost & Granger, Architects, The Temple, Chicago, want bids for removing the present Lake Shore & Michigan Southern and Rock Island station on Van Buren street, preparatory to erecting the new terminal station. The new station will be 10 stories high, 215 x 157 ft., with a trainshed 60 ft. high and 215 x 680 ft., accommodating 11 tracks. Bids for the structural steel for this shed have also been asked. The cost of the new depot will be about $1,000,000.

The same architects have also completed the preliminary plans for the new freight house and freight office for the Lake Shore & Michigan Southern to replace the present structure at Polk street and Pacific avenue. The new building will be three stories high, with foundations strong enough to carry four additional stories, and will cost $125,000.

EL PASO, TEX.—Officers of the various railroads entering El Paso are considering a site for the new union station.

HARRISBURG, PA.—The plans are now being drawn for the P. & R. new station here. The commencement of the work depends upon the completion of the Subway work.

MCKEESPORT, PA.—Local capitalists have organized the McKeesport Manufacturing Co., with a capital of $1,000,000, to build a tin plate mill at McKeesport. John W. Painter is President.

MARQUETTE, MICH.—The Marquette & Southeastern Ry., we are told, will build a passenger station in this city in the spring. It will be two stories high, 40 x 100 ft., and cost about $20,000. The company is also contemplating building a freight station, but nothing is decided.

MONTREAL, QUE.—The contract for the million-bushel steel fireproof elevator which the Montreal Harbor Commissioners propose to build in the center of the harbor, has been awarded to J. A. Jamieson, of Montreal, at $642,000

NAMPA, IDAHO.—The Oregon Short Line contemplates building a new passenger station in this place, but the plans and specifications were destroyed when the general office of the company was burned on Sept. 10. This will naturally delay the work. No contracts have been let.

OMAHA, NEB.—The Union Pacific has begun work on the new roundhouse at Omaha, and work on the new shop buildings is expected to start soon. The machine shop will be a steel structure about 400 ft. long and 150 ft. wide. (Aug. 2, p. 553.)

PHILADELPHIA, PA.—The Pennsylvania R. R. has awarded the contract for the foundations for the new passenger station at Thirty-second and Market streets to John Goll & Co. Bids for building the station proper are to be submitted not later than Oct. 21.

PITTSBURGH, PA.—Plans are being made by the Riter-Conley Mfg. Co. for a large plant to make steel-hull barges.

PORTLAND, ME.—The Grand Trunk Ry. is building a large elevator here. The work is well advanced and is being done under contract by the J. S. Metcalf Co., of Chicago. It is reported that the contractor is about to receive bids for material needed for the structure. When this elevator is finished the railroad will have three elevators in operation at this point.

RICHMOND, VA.—The Louisville & Atlantic will build a machine shop at Richmond.

RUTLAND, VT.—According to report, plans and specifications have been made for a new station for the Rutland R. R. in this city which will cost about $100,000.

ST. PAUL, MINN.—The Great Northern is reported ready to let contracts for its new shops, which have been under consideration for about three years.

SAN FRANCISCO, CAL.—With recent land purchases the Southern Pacific Co. now owns the block bounded by Howard, Folsom, Beale and Main streets, 550 x 275 ft., which will be used for additional warehouses, passenger and freight depots, also a switch yard.

SPRINGFIELD, ILL.—The Chicago & Alton has let a contract to N. S. Ohlson, of Springfield, for the new freight house and office building in Springfield which will cost $20,000. The railroad company has also recently let contracts for the following passenger depots: Granite City, Ill., jointly with the Big Four, to R. & S. Sollitt, of Chicago; Williamsville, Ill., to Nelson & Peterson, Chicago; Blackstone, Ill., and Pegrin, Ill., also to Nelson & Peterson; at Ashland the station is being built jointly with the Baltimore & Ohio Southwestern by N. S. Ohlson, contractor. Extensions are being built to the engine houses at Slater, Mo., and Roodhouse, Ill., by Nelson & Peterson. A new 7-stall engine house is being built at Springfield by the Culver Construction Co., of Springfield, at $8,000, and a new 7-stall engine house at Joliet, Ill., by O. A. Fisher, of Joliet.

TRENTON, N. J.—Plans are being made for the new armory for the Second Regiment by Gifford & Field, architects, of Newark, N. J.

WAYCROSS, GA.—The Plant System, according to report, will enlarge the railroad shops at Waycross.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvii.)

New York Railroad Club.

At the regular meeting last evening the discussion on the paper entitled "Brakes in Railroad and Street Car Service," by Mr. F. M. Nellis, was continued.

Canadian Society of Civil Engineers.

At the ordinary meeting of the Society in Montreal, on Thursday, Oct. 10, a paper on "Discharge of Sewage from Toronto Sewers in 1900," by C. B. Smith, was read and discussed.

American Society of Railroad Superintendents.

The thirty-first meeting of the Society will be held Thursday, Oct. 24, at 10:30 a.m., at Buffalo, N. Y., in the Iroquois Hotel. C. A. Hammond, Secretary, Mt. Vernon, N. Y.

Boston Society of Civil Engineers.

The regular meeting of the Boston Society of Civil Engineers was held on Wednesday, Oct. 16, 1901, at 7:30 o'clock p.m. Prof. William Carey Poland, of Brown University, read a paper entitled "The Development of Artistic Forms in Architecture from Elements of Construction," illustrated by lantern slides.

North-West Railway Club.

At the meeting held Tuesday evening, Oct. 15, at the West Hotel, Minneapolis, the following papers were presented: "Reflections on Steam Distribution for Locomotive Engines," by H. T. Herr, Division Master Mechanic, Chicago Great Western Ry.; "Paint," by Thomas Madill, Sherwin-Williams Co., Chicago.

American Society of Civil Engineers.

At the meeting of the Society, held on Wednesday, Oct. 16, a paper by Edward C. Murphy, Assoc. M. Am. Soc. C. E., entitled "Current Meter and Weir Discharge Comparisons," was presented and discussed. This paper was printed in the September, 1901, Proceedings.

The Franklin Institute.

On Wednesday, Nov. 13, 8 p.m., will be held a meeting of the Mining and Metallurgical Section. The paper will be "The Constitution of Metals and Alloys," by Dr. John A. Matthews, Columbia University, New York.

On Thursday, Nov. 14, 8 p.m., there will be a meeting of the Mechanical and Engineering Section.

American Street Railway Association.

At the annual election, Oct. 11, the following officers were chosen for the next year: President, H. H. Vreeland, of New York; First Vice-President, C. W. Wason, of Cleveland; Second Vice-President, E. C. Foster, of Boston; Third Vice-President, H. M. Sloan, of Chicago; Secretary and Treasurer, T. C. Penington, of Chicago; Members of the Executive Committee: Walton H. Holmes, of Kansas City; John A. Rigg, of Reading; D. B. Dyer, of Augusta, Ga.; T. J. Nicholl, of Rochester, and G. W. Dickenson, of Seattle.

American Association of Street Railway Accountants.

The officers elected on Oct. 11 are: President, H. C. Mackay, of Milwaukee; First Vice-President, C. L. S. Tingley, of Philadelphia; Second Vice-President, W. B. Longyear, of Brooklyn; Third Vice-President, S. C. Cooper, of Cincinnati; Members of the Executive Committee, W. T. Ham, of Washington; F. R. Henry, of St. Louis; Irwin Fullerton, of Detroit, and D. D. Bartlett, of Boston.

The Engineers' Club of Philadelphia.

A regular meeting of the Club will be held on Saturday, Oct. 19, 1901, at 8 o'clock, p.m. The paper will be "The Design and Construction of High Buildings." Illustrated. By William Copeland Furber.

At the meeting on Oct. 5, Mr. A. B. Eddowes presented a paper on "Some Unusual Locomotives." With the aid of lantern reproductions of photographs and drawings he described locomotives which had been built by Messrs. Burnham, Williams & Company, of Philadelphia, for special conditions in city and suburban traffic, in mining, on narrow gage roads of steep grade with smooth and rack rails, and to give unusual power for heavy traffic.

Central Railway Club.

The next regular meeting of the Central Railway Club will be held at the Hotel Iroquois, Buffalo, N. Y., on Friday, Nov. 8, at 2 p.m. Discussion on the report of the committee on the revised rules of interchange, also on the topical question in relation to steel driving wheel centers, will be continued. An amendment to the by-laws will be considered to change the time for holding regular meetings to the second Friday in January, March, May, September and November. Mr. John Player, of the Brooks Locomotive Works, will probably read a paper or give a talk on "Locomotive Piston Valves." Changes and modifications have been made in the rules and regulations for conducting the Question Box. Hereafter any subject presented in the Box is not to be aken up at a club meeting unless the propounder is present and gives his reasons for making the inquiry.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. W. A. Gaston has resigned as Chairman of the Board of Directors of the Boston Elevated Railway. He will, however, remain as a Director of the company.

—Hon. G. Gunby Jordan, of Columbus, Ga., has been appointed a member of the Board of the Railroad Commission of Georgia to succeed Hon. T. C. Crenshaw, whose term expired on the 15th.

—Mr. A. C. McCord, formerly General Manager, has been made Vice-President and General Manager of the Illinois Car & Equipment Co. Mr. McCord is a graduate of Princeton University, Academic Class of 89.

—Mr. William L. Webber, President and General Manager of the Saginaw, Tuscola & Huron, a leased line of the Pere Marquette, died on Oct. 15, at Saginaw, Mich., aged 76 years. He was born at Ogden N. Y., and was connected with the Flint & Pere Marquette, now known as the Pere Marquette, as General Solicitor and Counsel for over 30 years. He was also Land Commissioner for many years.

—Dr. Wilhelm Koch, from 1861 to 1897 editor of the *Journal* of the German Railroad Union, died in Berlin, Sept. 15, aged 78. Few of our readers will remember the name of this kind-hearted old gentleman, but nonetheless they are indirectly indebted to him and his associates and successors for a very large part of the information concerning foreign railroads which we have been able to give them.

—Mr. B. M. Temple, who died at Galveston, Texas, Oct. 5, was, for several years, Chief Engineer of the Gulf, Colorado & Santa Fe. Mr. Temple began his railroad career on the Missouri River, Fort Scott & Gulf, but later became Division Engineer of the Leavenworth, Lawrence & Galveston, and, in 1871, became Engineer of the Atchison & Nebraska. He then held a similar position on the Texas & Pacific, and took the position of Chief Engineer of the Gulf, Colorado & Santa Fe, in 1875.

—Mr. Isaac B. Thomas, who recently became Assistant Engineer of Motive Power of the Pennsylvania Railroad at Altoona, graduated from Yale University (Sheffield Scientific School) in 1892 and entered the service of this company the same year as an apprentice and has continued in its service ever since. From apprentice he passed through various subordinate positions until 1900, when he was appointed Assistant Master Mechanic at Renova. Mr. Thomas was born at West Chester, Pa., in 1872.

—Mr. Charles H. Wiggin, who was recently promoted to the position of Assistant Superintendent of Motiv Power of the Boston & Maine, began his railroad servic with this company in 1882 in the Boston shop as a machinist. He was later promoted as foreman of the machine department. This position he held until 1891, when he was made Master Mechanic in charge of the motive power and car department of the Concord Division. Then, from 1895 to 1901, he was in charge of the Concord and White Mountain Divisions, including the Concord shops. He was born in Durham, Stafford County, N. H., on Sept. 23, 1859. As will be seen his whole life has been spent with this company.

—A party of officers of the North Eastern Railway of England reached New York last Sunday morning in the "Celtic" and will spend some weeks in this country, going to Boston, Chicago, St. Louis, Pittsburgh, Altoona, Philadelphia, Baltimore, Washington and Newport News. This party consists of the following gentlemen: Mr. George S. Gibb, General Manager; Mr. Philip Burtt, General Traffic Manager; Mr. W. Worsdell, Chief Locomotive Superintendent; Mr. C. Harrison, Chief Engineer; Mr. T. Newell, Docks Engineer. Mr. Norman D. Macdonald accompanies the party as Secretary and Recorder. Mr. Macdonald, as our readers know, is an amateur of railroading, who has observed and written a good deal in quite recent years.

—Mr. Carl B. Smith, who, on Oct. 1, was promoted to be a Division Master Mechanic of the Boston & Maine, was born Nov. 28, 1867. He took a partial course at the Colgate Academy at Hamilton, N. Y., preparatory to entering Worcester Polytechnic Institute at Worcester, Mass., from which he graduated in 1888. He was Draughtsman at the Rhode Island Locomotive Works (now of the American Locomotive Company) from 1888 to 1895 and while there he was assigned to special work

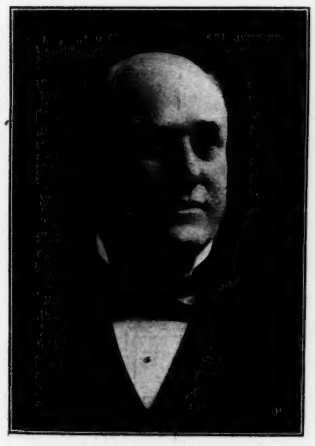
in the motive power department of the New York, New Haven & Hartford. In April, 1895, he was appointed Assistant Chief Draughtsman of the same department on the Boston & Maine and four years later became Chief Draughtsman, which position he has held up to the time of his recent promotion.

—Mr. Henry W. Cramp, Vice-President and Treasurer of the William Cramp & Sons' Ship & Engine Building Co., died on Oct. 3. Mr. Cramp was born in Philadelphia in 1851. In 1870 he entered the machine shop of the I. P. Morris Co. as an apprentice. When the Cramp Company leased the Erie Basin Dry Dock and established a New York office, Henry W. Cramp was placed in charge of it and held that position as long as the company continued to operate the dock. In 1886 he was elected Secretary of the Cramp Company, to succeed his uncle, Theodore Cramp. On the reorganization of the company, May 12, 1891, he was made a Director and served continuously as Secretary of the Cramp Company until June 6, 1895, when he was elected Vice-President and Treasurer, which position he held at the time of his death.

—Mr. Henry H. Courtright, whose serious illness we noted last week, died Oct. 11, at Chicago, Ill. About 10 days ago one of his feet was amputated because of gangrene, following an injury. Mr. Courtright was a native of Pennsylvania and was born in 1837. His railroad career dates from 1856, when he began as an agent on the Galena & Chicago Union. In 1865 he was appointed General Freight Agent on the Hannibal & St. Joseph, going to the St. Louis, Kansas City & Northern, in 1873, in a similar capacity, but he returned at the end of one year to the Hannibal & St. Joseph. From 1878 to 1879 he was with the Missouri Pacific as Commercial Agent, also General Agent of the Southwestern Railway Association. He was at one time General Western Freight Agent of the Chicago & Alton, and for 15 years (1881-1896) was General Freight Agent. Mr. Courtright had been the Chairman of the Western Trunk Line Committee since 1899.

—Mr. John Larkin Thorndike, M. Am. Soc. C. E., who died at Lima, Peru, Saturday last, was one of the best known and one of the ablest American engineers who practiced the profession in tropical American countries. He was born in St. Lawrence County, New York, about 65 years ago, and went to Chili early in the sixties and soon became associated with Henry Meiggs in the building of railroads in that country. When Mr. Meiggs began his energetic career in Peru Mr. Thorndike was his advance agent and made the preliminary surveys and organized the work on the Mollendo & Arequipa Railroad, the first of the mountain railroads to be built in that country. The Arequipa road is about 108 miles long; to this was afterwards added the Arequipa & Puno, and subsequently the Puno & Cuzco Railroad, the whole embracing about 400 miles of railroad. Mr. Thorndike became the Chief Engineer of all the Southern railroads in Peru which were contracted for by Mr. Meiggs, and completed all of these except the line to Cuzco, the construction of which was hindered by the financial depression of 1875. He lived in Lima and within the past 10 or 15 years has been interested in railroad contracting, having completed the Lima & Oroya Railroad for a British syndicate, and he has also been interested in local enterprises, and was the owner of several plantations, notably one for raising coffee near the coast above Lima. Mr. Thorndike became a member of the American Society of Civil Engineers May 7, 1873, and has always maintained an active interest in American engineering and acquaintance with American engineers, has visited this country at frequent intervals and landed in San Francisco last June, crossed the continent, spent a few days in New York and sailed for Europe about the 12th of July. His health had not been good for a year or two, but his death was quite unexpected to his American friends. Mr. Thorndike married in South America and leaves a wife and two daughters. He was an energetic and capable engineer, a man of excellent judgment and high character, universally esteemed and loved by all who knew him well. The American colony of Lima will feel his death keenly as will his acquaintances north of the equator.

—Mr. Joshua Twing Brooks, Second Vice-President of the Pennsylvania Company and of the Pittsburgh, Cincinnati, Chicago & St. Louis Railway Co., died at his home in Salem, Ohio, on the morning of Friday, Oct. 11, of Bright's disease. Mr. Brooks' father, J. J. Brooks, went to Ohio from Montpelier, Vt., settling in Salem in 1838, where he practiced law and became an important citizen. Joshua Twing Brooks was born in Salem, in 1840, and entered Yale College in 1857. The death of his father and mother compelled him to assume the charge of a large family of brothers and sisters and he was obliged to leave college before graduating. While there, however, he distinguished himself, having taken the sophomore prize in debate and having been an orator of the junior class. He was admitted to the bar in Ohio in 1865, served in the State Senate from 1866 to 1870, became solicitor for the Pittsburgh, Fort Wayne & Chicago in 1866, and later General Counsel for the Pennsylvania Lines West, and in 1891 he became Second Vice-President in charge of the law, treasury and real estate departments.



Mr. Brooks came into an administrative position after the problems introduced by the extension of this system beyond the western line of Pennsylvania had been taken up and partly worked out by Raney and Tilden. Profiting by their example and training in those matters, he developed and directed the legal steps necessary to the extension of the Northwest System and then, later, completed the most important work of his life—the reorganization and amalgamation of the various lines now embraced in the Pittsburgh, Cincinnati, Chicago & St. Louis and the Pennsylvania Southwest System. This process extended over years and was often stubbornly contested by holders of securities of subordinate lines, and by others. Mr. Brooks was the legal leader in the long struggle which resulted in the absorption of numerous small companies and their organization into the one great system which now serves a vast territory with singular efficiency and economy.

Among other branches of the work of his department Mr. Brooks was obliged to give careful attention to the matter of assessment for taxation, and by his knowledge, tact and skill he was able to defeat frequent unjust assaults. As the taxes of the Pennsylvania Lines West of Pittsburgh represent a yearly outlay of about $2,000,000, this part of his work was very important. He developed also the system whereby accidents and damages are reported and recorded in detail and the system under which claims are handled. In these matters the Pennsylvania Lines were leaders in the practice of reasonable and conciliatory treatment, a policy which has proved to be sound in a financial way as well as otherwise. For years Mr. Brooks contended against the custom of issuing annual passes to municipal, county and state officers, which he claimed is not only morally wrong but without practical use to the company. His ideas finally prevailed and for the last 10 years no state, county or city officer along the lines west of Pittsburgh has carried an annual pass over those lines. Mr. Brooks had a good deal to do, along with other officers of the system, in the work preliminary to the adoption of the benefit and pension fund system, the details of which for the Lines West were worked out by his brother, J. J. Brooks, the present General Counsel.

Mr. Brooks had a broad grasp of the principles of commerce and finance. He read and thought and spoke a good deal on these subjects. He was also much interested in politics in a broad way. He was a Republican for years but became a Cleveland man largely on the question of the tariff and was one of Mr. Cleveland's strong supporters during all of the time that Mr. Cleveland was an active leader. In the first McKinley campaign, Mr. Brooks, as a matter of course, returned to the Republican party and took the platform for McKinley, and in 1896 made a laborious and effective tour of the States in the Middle Mississippi Valley. Mr. McKinley personally expressed his high appreciation of the aid of Mr. Brooks in this campaign. Unfortunately, failing health prevented his taking an active part in the second campaign.

Mr. Brooks was a man of genial and kindly nature, generous, sympathetic, and active in all of his social relations. He maintained his home at Salem, Ohio, but for many years was able to spend only his Saturdays and Sundays there. For years, when he was not traveling and could not be at Salem, he spent his nights at a hotel in the communal settlement of Economy, where nobody is allowed on the streets after 9 o'clock and where the lights must be put out at that hour. Here he is supposed to have violated the municipal regulations quite systematically by burning his lamp till midnight or after, behind closed shutters. He was an occasional contributor to magazines and made frequent addresses before bodies like bar associations and bankers' conventions, having been President of the bank in Salem.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—F. M. Clough has been appointed General Foreman of Bridges and Buildings, with headquarters at Wellington, Kan., succeeding J. D. Hilderbrand. J. M. Wells, General Foreman of Bridges and Buildings at Newton, Kan., has been transferred to Fort Madison, Ia., and R. F. Guinn becomes Acting General Foreman of B. & B., at Newton.

Atlanta & West Point.—J. W. Gannon, son of Third Vice-President and General Manager F. S. Gannon, of the Southern, has been appointed Civil Engineer of the A. & W. P.

Baltimore & Ohio.—U. B. Williams has been appointed Superintendent of the Wheeling Division, with headquarters at Wheeling, W. Va., effective Oct. 10. This Division includes the line from Grafton to Wheeling and the Wheeling, Benwood and Bellaire Terminals.

Central of New Jersey.—F. L. Morse, Assistant Division Superintendent, with headquarters at Jersey City, N. J., has resigned.

Chesapeake & Ohio.—The reports, widely circulated, that the office of Second Vice-President is to be created with E. D. Hotchkiss in charge, and that the headquarters of H. W. Fuller, General Passenger Agent, are to be removed from Washington, D. C., to Richmond, Va., are entirely without foundation. The only change to be made is that Freight Traffic Manager F. M. Whittaker's headquarters will be removed from Cincinnati, Ohio, to Richmond.

Chicago & Southeastern.—C. M. Ward, General Manager, with headquarters at Muncie, Ind., has resigned.

Choctaw, Oklahoma & Gulf.—G. H. Moore, heretofore Auditor of the Galveston, Houston & Henderson, has been appointed Auditor of the C., O. & G., with headquarters at Little Rock, Ark.

Cincinnati, Georgetown & Portsmouth.—A. W. Comstock has been elected President, succeeding R. Peters.

Cincinnati, Portsmouth & Virginia.—(See Norfolk & Western.)

Copper Range.—E. H. Wright has been appointed Auditor and General Freight and Passenger Agent, with headquarters at Houghton, Mich., succeeding W. J. Souder, resigned.

Dunkirk, Allegheny Valley & Pittsburgh (Lake Shore & Michigan Southern).—The jurisdiction of Tracy W. Niles, Superintendent of the Eastern Division of the L. S. & M. S., at Buffalo, N. Y., has been extended over the D. & A. V. & P.

Gainesville & Gulf.—J. M. Graham has been elected President and L. E. Barker General Freight and Passenger Agent was appointed General Manager, succeeding V. J. Herlong, resigned.

Kansas City Southern.—Mord Roberts, heretofore General Master Mechanic of the Louisville & Nashville, has been appointed Superintendent of Motive Power and Machinery of the K. C. S., with headquarters at Kansas City, Mo., succeeding F. Mertsheimer, resigned.

Louisville & Nashville.—William J. Dickinson has been elected Third Vice-President. This is a new office and Mr. Dickinson will have charge of relations with competing and connecting lines and the management of the traffic department.

Mord Roberts, General Master Mechanic, with headquarters at Louisville, Ky., has resigned. (See Kansas City Southern.)

Missouri Pacific.—A. Harrity has been appointed Assistant Master Mechanic, with headquarters at Kansas City, Mo., succeeding T. Fielden, resigned.

Nashville, Chattanooga & St. Louis.—J. A. Johnson has been appointed Signal Inspector, with headquarters at Nashville, Tenn.

Norfolk & Western.—The Cincinnati, Portsmouth & Virginia having been acquired by the Norfolk & Western, it will, hereafter, be operated as the Cincinnati Division of the N. & W., and the jurisdiction of the officers of the N. & W. is extended over this division.

Pere Marquette.—H. Mann has been appointed General Foreman, with headquarters at Muskegon, Mich.

Raleigh & Western.—N. P. Bullard, heretofore Auditor of the Durham & Charlotte, has been appointed Auditor of the R. & W., with headquarters at Cumnock, N. C.

St. Louis & San Francisco.—L. H. Waugh has been appointed Master Mechanic, with headquarters at Sapulpa, I. T.

Southern Pacific.—C. C. Stroufe, heretofore Resident Engineer (Pacific System) at Tucson, Ariz., has been appointed Superintendent of the Tucson division, succeeding B. A. Worthington, transferred.

Wellington & Powellsville.—M. C. Hinshaw, General Freight and Passenger Agent, with headquarters at Woolson, Iowa, has resigned.

White Pass & Yukon.—E. C. Hawkins having resigned as General Manager, A. B. Newell, Vice-President, will discharge the duties of that office, with the title of Vice-President and General Manager.

Wilmington Seacoast.—M. F. H. Gouverneur was elected Vice-President, succeeding G. L. Morton, resigned; H. Wolcott becomes Secretary and Treasurer, succeeding Frank H. Stedman, resigned, and W. W. Randolph was appointed Consulting Engineer.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALABAMA ROADS.—It is said that the Birmingham & Montevallo Coal Co. will open a new mine at Lacy, near Gurnee, Ala., and will build about five miles of railroad to connect with it.

ALPENA, GAYLORD & WESTERN.—Maps have been filed showing the location of the route of the proposed line in Alpena, Montmorency and Otsego counties in Michigan. It is said that bonds have been issued to cover that part of the line from Alpena, on Lake Huron, to Gaylord, 63 miles west, on the Michigan Central, to the extent of $1,500,000, and that work will be begun on the line some time this month.

ARIZONA ROADS.—Contracts are reported let to Grant Brothers, of Los Angeles, for a railroad from Huron, Ariz., on the Huron & Eastern, to the Poland mine, eight miles distant. The estimated cost for the grading is about $200,000, as the route lies largely through rocky formation. It is said that work will be begun within two weeks and will require about six months for completion. (Construction Supplement, March 8, 1901.)

ASHVILLE & WEAVERVILLE (ELECTRIC).—This company is interested in building an electric road between Weaverville, N. C., and Burnsville, 18 miles distant, and is prepared to issue bonds to the extent of $160,000 to be applied to the construction.

ATCHISON, TOPEKA & SANTA FE.—See Railroad News.

BLACKWELL, ENID & SOUTHWESTERN.—An officer writes that a temporary survey has been run from Dyke, Okla., to Quanah, Tex., about 120 miles southwest, air line. No definite arrangements have yet been made toward building, but it is thought probable that this will be done in the near future.

BLOOMINGTON, DECATUR & SPRINGFIELD (ELECTRIC).—A franchise has been granted for an electric road between these three cities in Illinois. The entire right of way for 200 miles connecting the terminals is said to have been secured and it is agreed that work shall commence next spring. The Chicago & Alton, Illinois Central and Wabash are each paralleled for one side of the triangle which this new road will make.

BLUE RIDGE.—An officer writes in regard to the recent amendment to the company's charter in South Carolina, that there is no present intention of extending the line. The change in the charter was made to preserve the right to use the grading west of Walhalla, S. C., which was made some years previous by the old company known as the Blue Ridge Railroad, before the recent reorganization under the name of the Blue Ridge Railway. (Oct. 11, p. 711.)

CANADIAN PACIFIC.—Surveys are reported for the location of the proposed branch to extend northwest from Moosmin, Man.

Surveys are also reported for a new line from Greenway to Holdner, Man., a distance of about 100 miles.

CENTRAL NEW ENGLAND.—A new plan is now under consideration by this company for securing the 313-ft. strip of right of way across the Montague farm in East Granby which has been blocked by the New York, New Haven & Hartford, instead of making the expensive detour involved in going around the farm. The plan is to have the town condemn a strip of land across the farm as a highway and then grant the railroad right of way to cross the road. (Aug. 23, p. 596.)

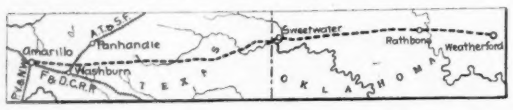
CENTRAL OF ALABAMA.—It is thought that work will begin shortly on the new line which has been surveyed between Decatur and Jasper, Ala., 76 miles. It will connect at the latter place with the Kansas City, Memphis & Birmingham. It is reported that the Louisville & Nashville is behind the project and that the Cincinnati Trust Co. will underwrite bonds for the purpose of building the road.

CENTRAL TRACTION.—This company has let a contract to grade the proposed electric railroad between Noblesville and Atlanta, Ind., through Cicero and Arcadia. The distance is about 14 miles, all on the line of the Lake Erie & Western. A new survey is to be made between Noblesville and Indianapolis. A survey 26 miles long is already in existence between these points, but it is desired to shorten it, after which grading is to be begun at once.

CHICAGO & NORTH WESTERN.—The branch, 20 miles long, between Pelican and Crandon, Wis., has been completed and was opened for business Oct. 7. (Jan 25, p. 69.)

CHOCTAW, OKLAHOMA & GULF.—The extension of this line from Weatherford to Sayre, Okla. T., 52 miles, is now completed, and on Sept. 29 trains were run through to

Sayre from Memphis, 627 miles away. Control of the Little Rock & Hot Springs Western, between Little Rock



and Benton, is assumed at the same time, through trains being run from Little Rock to Hot Springs. At the meeting of the shareholders, Dec. 2, a vote will be taken to ratify the lease of this portion of the Little Rock & Hot Springs Western Co. The accompanying cut shows the plan of the Choctaw, Oklahoma & Gulf extension from Weatherford to Amarillo, Texas, complete.

CINCINNATI, RICHMOND & MUNCIE.—At a special election, Oct. 8, Morgan and Porter townships, Ind., voted to give $30,000 aid to this company in the completion of its line. Trains are at present running between Cottage Grove, near Cincinnati and Fowlerton, Ind., 76 miles northwest, and the work of construction is being pushed on to North Judson, Ind., from whence it will be continued, it is thought, this fall, to Chicago.

CLARKSVILLE & NORTHERN.—Surveys are reported in Indian Territory for a new railroad between South McAlester and Clarksville, Texas, by way of Carbon, Hartshorne and Goodland, Ind. T. The distance from South McAlester to Clarksville is slightly over 125 miles in a southeasterly direction, and it is proposed to eventually extend the line to the Beaumont oil fields. Col. John Cody is the engineer in charge.

DAWSON RY.—An officer writes that this railroad from Dawson, in Colfax County, N. Mex., to Liberty, on the Chicago, Rock Island & El Paso, a distance of 145 miles, is under survey. Contracts are to be let about the first of January. (Sept. 27, p. 675.)

DELAWARE, LACKAWANNA & WESTERN.—A proposition has been made to the city of Summit, N. J., in accordance with which a depression of the tracks is provided from a point half a mile east of the Summit station to the city limits, about two miles. The estimate places the cost at about $525,000 and the city is asked to contribute 10 per cent. to that part of the depression which will be of direct benefit to it; or, in other words, the work as far west as High street. This would bring the city's contribution to $40,000.

DETROIT & MACKINAC.—Maps have been approved by the Board of Railroad Crossings in Michigan, showing the location of this company's proposed extension in Iosco County.

EDGEMORE & MANETTA.—This company is said to have been chartered to build a railroad three miles long from Edgemore, S. C., to the Manetta cotton mills, connecting with the Seaboard Air Line. (June 14, p. 421.)

ELDORADO.—It is said that a railroad is to be built from Ibex, which is 12 miles west of Needles, on the Santa Fe Pacific, 60 miles north to Eldorado Canyon, Nev., with joint track service over the Santa Fe Pacific between Needles and Ibex. Building is to be begun about Nov. 1.

FREMONT, ELKHORN & MISSOURI VALLEY.—Contracts for three miles of standard gage road from Gayville, S. Dak., to Lead, have been let to F. S. Lusk, of Chicago. The contract provides for the completion of the line by Jan. 1.

GEORGIA, FLORIDA & ALABAMA.—This company is said to have building under way on the 40-mile extension between Bainbridge and Tallahassee, Fla., and also on the 25-mile extension between Arlington and Cuthbert.

GRAND RAPIDS, KALAMAZOO & SOUTH HAVEN TRACTION.—Contracts have been let for the first 18 miles of this company's line near Allegan, Mich. The company was incorporated, with a capital stock of $800,000, to build from Grand Rapids through Kalamazoo to South Haven, a distance of about 100 miles. (Aug. 30, p. 612.)

GREAT NORTHERN.—The Souris extension of the Bottineau branch on the Dakota Division was reported opened for business, Oct. 7. This extension is 13 miles long, and runs west from Bottineau to Souris, N. Dak. (July 3, p. 491.)

GREAT NORTHERN OF CANADA.—It is officially stated that the contract for building the loop in connection with this company's line from St. Gabriels, Que., to Garneau Junction, has not yet been awarded, as announced in an issue of Oct. 11.

INDIANA ROADS (ELECTRIC).—Work is reported begun on an electric road 54 miles long between Goshen and Angola, Ind., under the same control as the line which was built two years ago between Goshen and South Bend. The new road is designed to carry both passengers and freight, and will form part of a large interurban system which is to eventually connect Goshen, Toledo, St. Louis and Chicago. 165 miles of this extended route is now building out of the 680 projected.

JACKSON & ALBION (ELECTRIC).—Articles of incorporation have been filed with the Secretary of State in Michigan, for an electric line from Jackson 18 miles west to Albion. The capital stock is $350,000. W. A. Boland is the principal stockholder and the proposed line is to become a part of his system.

KANSAS & SOUTHERN.—Surveys are reported for the permanent location of this projected line from Emporia, Kan., to Omaha, Neb. Part of the line is already built and running, and the project is said to be backed by the Missouri, Kansas & Texas. The air line distance between Emporia and Omaha is at least 200 miles. Major H. A. Schmanecke, of St. Louis, is the Chief Engineer and General Manager of Construction.

KENTUCKY WESTERN.—It is reported that the necessary funds have now been raised to extend this line, recently incorporated, from Dixon, the present terminus, to Owensboro, 40 miles. (June 21, p. 448.)

MOBILE, JACKSON & KANSAS CITY.—It is said that surveys are being completed to Hattiesburg, Miss., for the extension of this road now building, and it is thought that the work will be completed as far as Augusta, Miss., 19 miles southeast of Hattiesburg, by the first of January. The line at present terminates several miles southeast of Augusta. F. B. Merrill, of Mobile, is President and General Manager.

MOBILE & OHIO.—A company known as the Warrior Southern has been incorporated in Alabama to connect the Warrior Branch of the Mobile & Ohio with the Alabama Great Southern at Pasley, Ala., and give Mobile a new line to the Birmingham coal fields.

OREGON ROADS.—Surveys are reported in Gilliam County, Ore., for a railroad from Arlington, on the Columbia River, 36 miles south to Condon. The survey is at present completed for 15 miles. J. B. Hosford, of Condon, is interested.

PENNSALT.—Incorporation under this name has been filed in Indiana for a railroad one mile long, with a capital stock of $25,000, which is to connect the plant of the Pennsylvania Salt Works with the Detroit Southern near Wyandotte in Wayne County.

PEORIA BELT.—A considerable amount of right of way for this proposed belt line around the city of Peoria, Ill., is reported as being secured. It is the design of the projectors to connect all the railroads entering the city and enable the ready transfer of freight from one to the other. Officers have been elected and at a recent meeting of the directors it was decided to push the work with rapidity in order to have as much as possible of the line in operation by the first of next year.

PINE BLUFF & WESTERN.—This railroad, which has been in operation for some time between Pine Bluff, Ark., and Doyleton, 15 miles, is being extended to Sheridan, Grant County, Ark., and it is thought that it will be in operation to that point within six months. As soon as this work is completed a survey is to be commenced from Sheridan to Benton and Malvern, about 25 miles distant from Sheridan.

QUEEN ANNE'S.—This road, extending from Queenstown, 5½ miles northeast to Centerville, Md., has been opened for traffic and work is reported in progress on the extension from Queenstown, 14 miles west to Love Point. (Construction Supplement, March 8, 1901.)

QUINCY & SOUTHEASTERN ELECTRIC.—Application for a charter has been made for this company in the State of Illinois to build from Quincy, 38 miles northeast to Rushville, Ill., and eventually southeast from Quincy to Hardin, 65 miles distant. The following are interested: C. H. Castle, R. W. Gardner, George Wells, James E. Adams and L. J. Highland.

ROCHESTER & WABASH (ELECTRIC).—A franchise was granted to this company, in Indiana, Sept. 28, giving it the right to build the line from Rochester, Ind., 28 miles southeast to Wabash. The financiers are from Cleveland, and it is said that they have accepted the franchise, closed contracts and will begin work at once. The franchise will be forfeited if the line is not built by July 1, 1903.

SALINE RIVER.—It is thought that the extension from Draughan, Ark., to New Edinburg, nine miles, will be in operation Jan. 1.

SOUTHERN MISSOURI & ARKANSAS.—The extension from Mingo, Mo., to Poplar Bluffs, 17 miles, was opened for traffic on Oct. 15.

ST. LOUIS & SAN FRANCISCO.—An officer writes in regard to the proposed extension between Chandler and Ocmulgee, Okla., that surveys have been made but no other steps toward construction have as yet been taken. (Oct. 11, p. 712.)

It is reported that a line is to be built from a junction with the Kansas City, Memphis & Birmingham, about 12 miles long, to a point near Corona, Ala.

TENNESSEE ROADS (ELECTRIC).—Right of way is said to have been granted for an electric railroad between Knoxville and Sevierville, Tenn. The length is about 29 miles, and A. S. Johnson, of Kimberlin Heights, Tenn., is interested.

WEST POINT & HOUSTON.—A meeting of the citizens of West Point, Miss., was held Oct. 1, to consider a proposition from a railroad syndicate represented by Mayor F. M. Abbott. In accordance with the proposition if West Point, Clay County and Chickasaw County each subscribe $15,000 the syndicate will build a steam railroad from West Point to Houston, Miss., 30 miles.

WINSTON & WADESBORO.—Surveys for this proposed line from Winston, 90 miles south to Wadesboro, N. C., are reported along the Yadkin River, eight miles from Wadesboro. It is said that a bridge is to be built over Rock River near where it enters the Yadkin, and that the Yadkin is to be bridged just above the narrows. (June 14, p. 422.)

GENERAL RAILROAD NEWS.

ATCHISON, TOPEKA & SANTA FE.—It is said that bonds will be asked on the new extension of the Gulf, Beaumont & Great Northern, which has recently been completed from Rogan to Jasper, Texas, 12 miles, and has seven miles of track laid beyond Jasper and 15 miles beyond that graded.

BLUE RIDGE.—An order has been signed by Judge Simonton in the U. S. Circuit Court at Charleston, S. C., discharging H. C. Beattie, Receiver. Mr. Beattie has been made President, and will continue in charge of the road.

CHESAPEAKE & WESTERN.—A deed of trust for $1,435,000 has been filed with the Bowling Green Trust Co., of New York, for first mortgage bonds. The company is now engaged on an extension between Virginia and the West Virginia coal fields which is to shorten the haul to the seaboard 100 miles.

CHICAGO, BURLINGTON & QUINCY.—This company has given notice to the Railroad Commission in Iowa of their complete absorption of the Cincinnati, Fort Madison & Des Moines, which runs between Fort Madison and Ottumwa, Iowa. This latter company has been previously controlled by ownership of all its securities, but the new change will take it from what is known as Class C, which includes railroads in the State that earn less than $3,000 per mile gross, and place it in Class A. Roads in the former class are entitled to charge 30 per cent. more than the "Class A" roads in the Iowa classification of freight rates issued by the Commissioners.

COLUMBUS, KINKORA & SPRINGFIELD.—Public sale of this property under foreclosure is ordered at Mount Holly, N. J., Oct. 18. The road is about 10 miles long, was opened in 1872, and is operated under lease by the Pennsylvania in connection with the Amboy Division, the yearly rental being the net earnings. These earnings have been inadequate to meet the interest upon the bonds for some time.

KANSAS CITY, FORT SCOTT & MEMPHIS.—Authority has been granted by a majority of the stockholders in the above named road to purchase the Current River R. R., which extends from Willow Springs to Grandin, Mo., 81 miles. The Kansas City, Fort Scott & Memphis has for some time controlled the majority of Current River stock.

LAKE SHORE ELECTRIC.—This company, recently mentioned as absorbing a number of Ohio interurban electric lines, is to make a mortgage to secure $6,000,000 of 30-year 5 per cent. bonds. It is said that $4,000,000 of this issue will be on the present mileage, which is 160 miles, and that the remainder is intended for extensions. The gross earnings of the companies, on an average of about 125 miles of track for the three months ending Aug. 31, were $117,558, and the company hopes, when its projected system is in full running order, to earn over $600,000 a year gross and $300,000 a year net.

MEXICAN NATIONAL.—Speyer & Co. and Kuhn, Loeb & Co., of New York, and Speyer Bros., of London, announce readjustment of this property by the creation of the following new securities, as compiled by the *Chronicle*.

An issue of prior lien 4½ per cent. 25-year gold bonds, subject to call at 105 and interest on six months' notice to be secured by a mortgage upon the direct property of the Mexican National and also upon the securities of the Texas-Mexican Co. This issue may be increased not to exceed $3,000,000, but such bonds are not to be sold before 1904, except in the event of unexpected expenses in changing the gage and building the proposed extension to El Salto.

First consolidated mortgage 50-year 4 per cent. gold bonds, to be secured by a mortgage or deed of trust upon all the properties covered by the prior lien mortgage above mentioned. Total issue not to exceed $60,000,000, of which $11,404,687 are to be applied in partial exchange of existing securities; $3,595,313 have been purchased by the syndicate to provide cash requirements; $23,000,000 are reserved to retire new prior lien bonds at or before maturity; $7,000,000 may be issued, with $7,000,000 of preferred stock, to acquire securities of the Mexican International, including at least a majority of the capital stock of the latter; $6,000,000 are reserved for betterments and improvements on the properties covered by the first consolidated mortgage or for the acquisition of equipment for use thereon, not to exceed $500,000 a year; $9,000,000 are reserved for acquisition of new property and for extensions at not exceeding $10,000 a mile of standard gage line, or $7,500 per mile of narrow gage line on which the consolidated mortgage will be a first lien.

An issue of $32,000,000 preferred stock, entitled to receive non-cumulative dividends at a rate not to exceed 4 per cent. per annum before the payment of any dividend on the common stock, but not to be entitled to any dividends in excess of 4 per cent. per annum. This stock is to be applied as follows: In partial exchange for existing securities, $20,663,625; purchased by syndicate to provide cash requirements of plan, $1,000,000; in compensation for surrender of all rights of the Mexican National Construction Co., under their agreement with the Mexican National R. R., $1,400,000; issuable, if deemed best, for acquisition of Mexican International securities, $7,000,000; reserved for contingencies, $1,936,375; also an issue of $33,350,000 common stock, to be applied in exchange for existing capital stock dollar for dollar.

In order to establish such control of the new company as shall secure a satisfactory management of the property for a period of years, both classes of stock of the new company, with the exception of shares to qualify directors, shall be vested in three voting trustees, to be appointed on or before the completion of readjustment by the readjustment managers for five years, and for such further period, if any, as shall elapse before the preferred stock shall have paid 4 per cent. cash dividends per annum for two successive years, although the voting trustees in their discretion may deliver the stock at an earlier date, as provided in the trust agreement.

Bonds and stock may be deposited under the plan on and after Oct. 14, either with Speyer & Co., 30 Broad street, New York, or at the office of their agents in London and Amsterdam, in exchange for readjustment certificates of deposit. The readjustment plan includes standard gaging of the main line and other improvements which will amount to about $10,200,000.

PITTSBURGH & WESTERN.—This road was sold at auction, Oct. 9, to comply with the formal requirements of the law, and was bought by the Baltimore & Ohio for $3,000,000, subject to three mortgages amounting to $10,360,000. There were no other bidders. The system includes 133 miles of trackage owned and 220 more leased, and has for some time been under the control of the Baltimore & Ohio.

SEABOARD AIR LINE.—The consolidation charter of this company was issued by the Secretary of State at Columbia, S. C., Oct. 1. The charter was granted under the new act of 1901, allowing companies operated within the State to merge and consolidate their capital stock, franchises and property with companies organized under the laws of South Carolina, or of any other state whenever two or more of the said companies are continuous or connected. The consolidation of the Plant System, recently effected, was under the same law. The Seaboard Air Line consolidation is a merger of the following companies: Seaboard Air Line; Raleigh & Gaston; Augusta Air Line; Carolina Central; Georgia, Carolina & Northern; Palmetto; Chesterfield & Kershaw, and South Bound. The charter is issued to John Skelton Williams, J. W. Middendorf and L. R. Watts, as individuals, and the main offices of the company are stated as being in the cities of Richmond, Va.; Portsmouth, Va.; Raleigh, N. C.; Atlanta, Ga.; Columbia, S. C.; Savannah, Ga.; Montgomery, Ala.; Jacksonville, Fla., and such other places as the directors may designate.

WABASH.—The Omaha & St. Louis, 144 miles long, which extends from Council Bluffs, Iowa, to Pattonsburg, Mo., was sold on Oct. 12 for $1,250,000 to Edward W. Sheldon, of New York, representing the bondholders of the Wabash. There were no other bids and the price paid was the minimum permitted under the order of sale. The Wabash has issued $3,500,000 bonds and is to spend $500,000 of this in betterments on this property. It has also purchased the Boone County & Boonville, a road 22 miles long, previously held under lease.

This company is said to have made track arrangements with the Cleveland, Cincinnati, Chicago & St. Louis for an entrance into Cleveland.

WESTERN MARYLAND.—A resolution was introduced in the City Council of Baltimore, asking as to the rights of the Mayor and City Council in regard to the proposed sale of the city's interest in this road running between Baltimore and Williamsport, Md., 90 miles. City Solicitor Whyte says: "Any private sale of the city's interests, as stockholder and mortgagee, would require the authority of an ordinance of the Mayor and City Council of Baltimore." (Sept. 20, p. 660.)

WEST VIRGINIA CENTRAL & PITTSBURGH.—An issue of $1,000,000 new stock was authorized at the last annual meeting of the shareholders. A portion of this issue is to be applied to increasing the company's holdings in the stock of the Piedmont & Cumberland, these holdings having been raised from 65 to 92 per cent. of the total issue of $650,000, and a portion will be used for the absorption of the Buxton & Landstreet Coal Co., and other coal properties.